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# Development, Evaluation, and Efficacy of a Heart Healthy Curriculum in Two Different Education Settings; Emphasizing Food Portioning and Cooking Skills, Increased Fruits, Vegetables, Whole Grains, Low-Fat Dairy, and Exercise

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# DEVELOPMENT, EVALUATION, AND EFFICACY OF A HEART HEALTHY CURRICULUM IN TWO DIFFERENT EDUCATION SETTINGS, EMPHASIZING FOOD PORTIONING AND COOKING SKILLS, INCREASED FRUITS, VEGETABLES, WHOLE GRAINS, LOW-FAT DAIRY, AND EXERCISE

by

Rachel Richins

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# ABSTRACT

Development, Evaluation, and Efficacy of a Heart Healthy Curriculum in Two Different Education Settings; Emphasizing Food Portioning and Cooking Skills, Increased Fruits, Vegetables, Whole Grains, Low-Fat Dairy, and Exercise.

by

Rachel Richins, Master of Science

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Cardiovascular disease (CVD) is a leading cause of mortality and morbidity in the United States. The prevalence of CVD will increase in conjunction with the rise in obesity and type 2 diabetes and decrease in physical activity, due to the adverse effects of adiposity and atherosclerosis associated with these syndromes. Excellent inpatient, outpatient, and community-based programs are available to educate and direct healthy behavioral changes, yet the number of programs available is not sufficient for the volume of patients, nor widely distributed in all areas (particularly rural areas). There is a lack of comprehensive education programs for adults directed toward decreasing CVD with an emphasis on food portioning skills; cooking skills; low-fat cooking techniques; increasing fruits, vegetables, and dairy products in the diet; and increasing exercise.

The Cooperative Extension Healthy Beat education program and curriculum was developed and evaluated to improve the cardiovascular health of Utah residents. This curriculum focused on improving nutrition knowledge, food portioning skill, food

preparation/cooking skills, regular exercise, lipid panel, anthropometric indices, and blood pressure. The program was distributed in CD format to 59 extension agents; identical CDs were used by instructors of live sessions for 43 participants in Sanpete, Washington, and Beaver counties. The CDs were also used by the instructor of a third group, consisting of 16 nutrition education assistants from the Expanded Food and Nutrition Education Program, who were also taught in a live session setting. The evaluation was done through measurement of nutrition knowledge, cooking skills, lipid panel biochemical indices, weight loss, blood pressure, and waist and hip circumferences.

This study demonstrated that on completion of the heart healthy curriculum, those with CVD or those at risk for CVD appropriately altered their risk factors for a myocardial infarction (decrease in one or more of the following: serum total cholesterol, LDL cholesterol, blood pressure, weight, body mass index, and waist and hip circumferences).

(98 pages)

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Rachel Anne Richins

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# CHAPTER 1

# GENERAL INRODUCTION AND LITERATURE REVEIW

## Background and Prevalence

Cardiovascular disease (CVD) was the leading cause of death in the nation accounting for 38.6% of all deaths and was a contributing factor to 60% of all deaths in 2004 (1). The American Heart Association (AHA) reported the 2003 United States (U.S.) prevalence as 71,300,000 American adults with one or more types of CVD (2). Cardiovascular disease comprises a group of conditions. The conditions are listed as follows with U.S. prevalence reported in parenthesis: high blood pressure (65,000,000); coronary heart disease separated out into myocardial infarction (7,200,000) and angina pectoris (6,500,000); congestive heart failure (5,000,000); stroke (5,500,000); and congenital cardiovascular defects (1,000,000). The Utah death rate from CVD was 185.2 per 100,000 compared to the national average of 246.8 per 100,000 (3) or about 400,000 deaths per year in Utah (4). Although Utah had a better "report card" on CVD death rate, CVD was still the leading cause of death in Utah.

The prevalence of CVD in the U.S. increased with age, at a rate of 7 per 1,000 men in the 35-44 age bracket, rising to 68 per 1,000 in the 85-94 age bracket (2). There were comparable rates for women, but the age at which they occur was 10 years later. It is expected that CVD prevalence will continue to increase due to the aging of the population and increases in the rates of obesity and type 2 diabetes.

If all major forms of CVD were eliminated, the average life expectancy would increase by 7 years, while eliminating all types of cancer would increase the average life

expectancy by 3 years. The 2004 estimated cost of CVD was $368.4 billion. The 2006 estimated cost of CVD was $403.1 billion (2). The source of this information came from a combination of resources: the NHANES 1999-02, The Center for Disease Control, The National Center for Health Statistics, and hospital discharge data as reported in the Heart Disease and Stroke Statistics – 2006 Update (2).

The scope of this literature review will cover the significance of health education and the lack of food portioning skills, as well as factors that contribute to cardiovascular disease with the rational for inclusion of these into the curriculum: Indicators for Cardiovascular Disease, Metabolic Syndrome, Dietary Approaches to Stop Hypertension (DASH Diet), Weight Loss, Exercise, Dietary Lipids, and Folic Acid.

**Significance of Health Education and Lack of Food Portioning Skills**

There are specific arenas of cardiovascular program development: community-based, hospital-based, general practice settings which can all be a rural or an otherwise stated population. There are also programs previously developed that intervene with specific aspects of cardiovascular health, however the scope of this literature review reports programs developed in outpatient settings for overall heart health including but not limited to stroke, myocardial infarction, coronary artery disease, and hypertension. It can also be divided into categories of intervention programs. Programs that consisted of improvement strategies in nutrition, knowledge, behavior, physical activity, weight management (in relation to CVD risk factors), food portioning skills, and label reading skills were reviewed.

In 2002, the position of the American Dietetic Association reported that successful programs should focus on an active behavioral approach with emphasis on correct food portions, moderation, and balance of diet and physical activity over time (5). Similar statements by Ello-Martin et al. (6), suggested that multifaceted approaches are needed, and that well-funded program initiatives should include tools to aid selection of appropriate portions, and provide information about how the energy density of foods affects decisions about portion size, in order to expand individuals' knowledge and skills. In 1986 the "Minnesota Heart Health Program" (7) approached community-based research programs with a design to decrease risk factors and coronary disease population-wide and found that even with an intense program, risk reduction education and activities did not keep up with coronary disease risk factors. "Hearts for Life" was a recent community based program intended to educate 1,016 healthy volunteers about risk factors and ways to modify them, which resulted in significant knowledge increase ($p < .01$) (8). "Choose to Move" in 1999 (9) was an effective 12- week program designed by the AHA for women in the United States. Participants received manual and weekly information on how to manage cardiovascular disease risk factors and how to initiate lifestyle changes. Reports stated that physical activity increased ($p = .001$), participants limited excess calories and fat ($p = .001$), and knowledge increased, which provides a model for low-cost self help programs that support Healthy People 2010 objectives for better nutrition, increased physical activity and overall improved cardiovascular health.

Another program designed by the AHA entitled "Heart At Work," promoted risk factor awareness at two factory sites which resulted in improved knowledge and goals to improve diet and weight management (10). Huang et al. reported the effectiveness of

heart health promotion education programs in community settings, while Graffagino et al. more specifically reported a successful program that targeted weight management (11, 12). The hospital-based outpatient/community program "Beyond Heart Disease" was developed in 1994 (13), to meet community health education needs. Participants met twice a week for six weeks, and the program included lipid testing, a syllabus, lectures, discussion, goal setting, nutrition analysis, and stress reduction sessions. In 2001, the 5-year, hospital-based "Otsego-Schoharie healthy heart program" intervened in a rural town in New York to increase knowledge, nutrition, and physical activity, decrease smoking, and identify hypercholesterolemia and hypertension (14). General Practice settings allow for implementation of cardiovascular programs. The "Food For Heart Program" was a nutrition tool administered to 175 hypercholesterolemia participants to assess its effectiveness (15). Intervention of four monthly dietary counseling visits using the program showed that total and low-density lipoprotein cholesterol decreased ($p < .001$), there was no change in high-density lipoprotein cholesterol, and participants lost a small but significant amount of weight ($p < .01$).

Since the development of previous intervention programs, research into the heart disease process and specific nutrient benefits, has created a need for more emphasis on food portion control, an even greater emphasis on fruit, vegetable, low-fat dairy, and fiber intake, and physical activity. Increasing availability of education programs through macromedia and online distance education also creates a need for validated, easily distributed programs to be used in various settings that include these concepts.

## Factors Contributing to Cardiovascular Disease --- The Rational for Measurement Tools and Inclusion of these Topics into the Curriculum

### *Indicators for Cardiovascular Disease*

Risk factors for cardiovascular disease have been studied extensively due to the high prevalence of this disease. The following list includes factors generally agreed upon as contributing to CVD: cigarette smoking; hypertension; a positive family history; high total and LDL cholesterol; low HDL cholesterol; advancing age; obesity; diabetes; stress; hypertriglyceridemia; high lipoprotein (a) levels; high saturated fat, low proportion of mono and poly unsaturated fat, and a low fiber diet; menopause; use of oral contraceptives; abdominal or central obesity; high homocysteine levels; and inflammatory markers such as C-Reactive Protein (16). A few of these risk factors are discussed below as independent or interrelated characteristics of the disease.

### *Metabolic Syndrome*

Metabolic syndrome is defined as a group of metabolic risk factors that occur simultaneously in one person and include: abdominal obesity, dyslipidemia (high triglycerides, and LDL cholesterol, low HDL cholesterol), elevated blood pressure, insulin resistance or glucose intolerance, prothrombotic state, proinflammatory state (elevated C-reactive protein in the blood) (17). Quantitative results from a meta-analysis of cardiovascular disease risks in relation to the metabolic syndrome, strongly suggested that the metabolic syndrome is a risk factor for CVD incidence and mortality (18).

*Dietary Approaches to Stop Hypertension (DASH Diet)*

The Dietary Approaches to Stop Hypertension (DASH) diet consisted of a balanced diet patterned from the Food Guide Pyramid with a minimum of three dairy servings and five fruits and vegetable servings per day. In a meta-analysis of 42,000 participants from two major studies conducted by McCarron and Heaney (19), the improvement in diet quality from the DASH diet resulted in a 30% to 40% reduction in death from cardiovascular disease and cancer. This review of studies reported a 50% improvement in clinical conditions, specifically a 30% reduction in obesity and a 65% reduction in hypertension. In addition to the improved cancer, obesity and cardiovascular rates from following a DASH diet, there was decreased prevalence of osteoporosis, nephrolithiasis (kidney stone formation), and pregnancy induced hypertension. The estimated health care savings from following the DASH diet was $200 billion over a 5-year cumulative period, with $37.5 billion coming from obesity prevention alone (19).

In a study to compare a diet high in fruits and vegetables to a diet high in dairy products plus fruits and vegetables (DASH), the DASH diet resulted in lower total and LDL cholesterol without significant effects on triglycerides (20). The fruits and vegetables diet did not have an effect on lowering lipid levels. There was however a reduction in HDL cholesterol (-3.6 mg/dL for the control, -3.9 mg/dL for the DASH, and -3.4 mg/dL for fruit and vegetable group) that the authors recommend should receive further investigation. The men in the study had a greater reduction in total and LDL cholesterol than the women.

*Weight Loss*

Adiposity has a detrimental effect on serum lipid levels, and high lipid levels in turn are associated negatively with CVD. There is individual variation on the impact of adiposity on serum lipid levels, but Oberman et al (21) reported a 5 to 10 pound weight gain in the average man can raise triglyceride levels by 10 mg/dL, and decrease HDL levels by 5-10 mg/dL. A recognized mechanism on the effect of obesity on serum lipid levels is that abdominal obesity appears to promote excessive release of free fatty acids into the portal circulation (21). An increase of free fatty acids into the portal system, increases triglyceride synthesis in the liver; thus leading to elevations in VLDL and LDL cholesterol. Obesity also lowers lipoprotein lipase activity, largely due to insulin resistance, resulting in reduced VLDL clearance from plasma. The greater increase in HDL cholesterol after weight loss in men over that seen in women may be the loss of abdominal fat (abdominal fat distribution is seen most commonly in men, whereas women have a more disperse pattern of fat accumulation). In a recent review of adiposity and heart disease, the relationship of obesity and myocardial steatosis was observed (22). The authors stated that myocardial lipid content appears to increase with the degree of adiposity and could possibly be a contributing factor in adverse structural and functional cardiac adaptations.

*Exercise*

Studies comparing sedentary adults and regular exercisers have shown a reduction in mortality and morbidity in the exercisers (16, 23). The protective effects of exercise was attributed to reduced body weight, improved lipid profiles, reduced blood pressure,

and improved glucose tolerance. The protective effect of exercise may be dose dependent and occurs in men (16) and in women (23). Men who ran at least 8 miles a week had an increase in their HDL cholesterol of 4.4 mg/dL, resulting in a recommendation of a minimal energy expenditure of 800-1,000 calories per week, or 8-10 miles of jogging per week. The women had improved lipid levels if they ran 15-30 miles per week. Lower-level exercise in women did not result in a lowering of lipid levels, but did result in lower body fat. A meta-analysis recently selected 10 studies out of 3,000 reviewed to analyze effects of aerobic exercise on lipids and specific lipoproteins in adults with CVD (24). A statistically significant increase of 9% in HDL cholesterol, and significant decrease of 11% in triglycerides (no significant difference in total cholesterol or LDL cholesterol), confirmed that chronic aerobic exercise does in fact increase HDL cholesterol and decrease triglycerides in adults, especially men, with CVD.

In light of the ever advancing burden of obesity and CVD, research has turned to looking at powerful intervention strategies that pinpoint psychosocial determinants of success or failure of physical activity interventions for different populations. Nies et al. reported that "self-efficacy" (the individual's perception of capability) was a frequent determination of physical activity level; and if self-efficacy expectations were increased, healthy behaviors would also increase (25). No strategy stands alone in the success of intervention programs. Raising perception of capability should be supported with other strategies such as relapse prevention and goal setting as proven by Nies et al., Krummel et al., and Dishman et al. (26, 27, and 28). With increased strategies and promotion of exercise recommendations, there is still minimal activity according to statewide data (29).

Focus is now being turned towards eliminating perceived personal, social, and environmental barriers (30, 31, and 32).

*Dietary Lipids --- Saturated vs. Mono- and Polynsaturated Fats*

The effect of a low fat diet (The American Heart Association Diet 25% fat, 7% saturated fat and 12% as monounsaturated fat) versus three diets high in monounsaturated fat (olive, peanut oil, and peanut butter with 34-36% of calories as fat, 8% saturated fat and 17-18% as monounsaturated fat) and a typical high saturated fat diet (34% of calories as fat, 16% as saturated fat and 11% as monounsaturated fat) was reviewed for it's effect on serum lipid levels (33). Twenty-two subjects consumed all five diets, and served as their own controls. The three monounsaturated diets lowered total cholesterol levels by 10%, LDL cholesterol by 14%, and triglycerides by 13% from the traditional diet, and did not increase the HDL cholesterol level. The low-fat diet lowered the HDL cholesterol by 4% and increased triglycerides by 11%. The authors concluded that the diets high in monounsaturated fats decreased CVD by 26% for the olive oil diet, by 16% for the peanut oil diet, and 21% for the peanut-butter diet.

Noakes and Clifton (34) studied 62 subjects consuming a very low fat diet (10% of calories as fat, 3% from saturated fat), a high saturated fat diet (32% of calories as fat, 17% as saturated fat) or a high monounsaturated fat diet (32% of calories as fat, 24% as monounsaturated). Subjects were matched into groups by age, gender, body mass index and serum lipid levels. There was a significant decrease in LDL cholesterol for both the low fat diet (-26.4 mg/dL) and the high monounsaturated diet (-27.2 mg/dL). The high fat diets resulted in lower LDL cholesterol than the low fat diet (- 0.8 mg/dL for the

saturated diet, -1.6 mg/dL for the monounsaturated diet and -36 mg/dL for the low fat diet). The authors concluded that when considering both the LDL and HDL cholesterol changes, the monounsaturated diet was most beneficial for cardiac health.

*Folic Acid*

Elevated homocysteine concentration has previously been shown to be an independent risk factor for CVD (35, 36). It is important to distinguish characteristics of the populations studied: existing heart disease or not, general CVD, CHF, Stroke, or previous MI. It is also important to note if the report is about homocysteine itself or if the study is trying to establish associations between supplementation of vitamins to reduce homocysteine. Homocysteine is elevated with a low serum (and thus dietary) level of folic acid and vitamin B12. Giles et al. (35) used data from the NHANES III survey (4534 subjects) to assess if those with the lowest vitamin B12 and folic acid concentration had the highest CVD risk. There was an inverse relationship between serum folate and homocysteine levels, and inverse relationship between vitamin B12 and homocysteine levels. There was no significance in the stroke and nonstroke groups in folate or vitamin B12 concentration; however, significant difference was found with homocysteine concentration and likelihood of stroke ($p < 0.001$) (35).

Yoo et al. (36) reported a similar finding between 78 patients admitted to a hospital for a nonfatal cerebral infarction and 140 non-cardiac patients. After adjusting for total cholesterol, hypertension, smoking diabetes and age, the cardiac patients had a higher homocysteine level. The degree of homocysteine elevation was significantly associated with the number of stenosed vessels, and in disease states this is found to be true (37, 38).

In review of the original Framingham study, Selhub (38) noted that homocysteine levels increase with age and are higher in men than women, however it was also reported that two-thirds of the prevalence of elevated homocysteine is dietary related. The verdict is not out in using a specific level of homocysteine for preventive measures, so education about homocysteine in relation to nutrient concentration was taught in the curriculum.

To correct high homocysteine levels, Brouwer et al. (39) reported that a dose as low as 250 µg per day of folic acid was effective in reducing homocysteine levels. Malinow et al. (40) reported that homocysteine could be kept in normal range with 200 µg per day of folic acid. Both authors felt this could be accomplished with a daily consumption of ready to eat breakfast cereal.

It is reported that the focus should not be placed in lowering methionine (the precursor to homocysteine); however, focus *should* be placed in consuming certain levels of folic acid, vitamins B12 and B6 (41). It has also been stated recently that randomized controlled trials of homocysteine-lowering therapy have failed to prove a causal relationship in preventing CVD (42, 43). Lonn et al. (43) reported that after studying 5,522 patients with vascular disease and diabetes, it appears that supplements combining folic acid and B vitamins did not reduce risk of cardiovascular events in populations with existing heart disease. The participants were randomized to daily treatments of a combination of 2500 µg of folic acid, 50 mg of vitamin B6, and 1 mg of vitamin B12, or a placebo for 5 years.

It is still unclear if elevated homocysteine is one of many causative factors of CVD or if it's presence is more of a byproduct or indicator for future complications of heart disease. Most researchers, including a statement from the American Heart

Association nutrition committee (44), have come to the consensus that supplementation of folic acid and a vitamin B complex (consisting of vitamins $B_6$ and $B_{12}$), are safe and should not be ruled out as a treatment to lower homocysteine, however it is important to not overrate the significance. Varga et al. (45) reported more specifically on this concept in relation to atherosclerosis and thrombosis and whether lowering homocysteine lowers the risk for these events. He concluded from review of two clinical studies directed at these specific events that lack of strong data suggested that lowering homocysteine levels did not show a decrease in heart attacks, strokes, or venous blood clots. He further concluded, however, that elevated homocysteine should still be treated because the connection between the two is still possible and that folic acid and a vitamin B complex appear to be safe.

The purpose of this study, and the focus of the Healthy Beat program, is two fold. The first is to improve the cardiovascular health of Utah residents through a curriculum focusing on food preparation, cooking skills and exercise. Teaching food portion skills is a useful and effective technique, based on the literature stating that hands on techniques are effective approaches, and previous experience with diabetes education curriculum (46, 47). The hands on practice, combined with goal setting, assessing readiness to change, acknowledging barriers to healthy behaviors, and implementing the literature on fruits, vegetables and exercise is a very effective method. The evaluation was done through measurement of nutrition knowledge, cooking skills, lipid panel biochemical indices, weight loss, blood pressure, and waist and hip circumference, and endurance as measured by a 6-minute walk test.

The second purpose is to compare live teaching sessions with self-paced CD lessons of the same program curriculum. The program was distributed in CD format to individual Extension Agents; identical CDs were used by the teachers of live sessions in Sanpete, Washington and Beaver Counties. The CDs were also used by the teacher of a third group, consisting of nutrition education assistants from the Expanded Food and Nutrition Education Program, who were also taught in a live session setting.

# CHAPTER 2

# DEVELOPMENT AND ANALYSIS OF THE HEALTHY BEAT CARDIOVASCULAR CURRICULUM

## Abstract

**Background:** Excellent programs are available from studies done in inpatient/outpatient hospital settings and community-based settings to educate and direct heart healthy behavioral modification, yet for the volume of patients, the number of programs that focus on hands on experience is not sufficient, nor widely distributed in all areas (particularly rural areas).

**Objective:** To test the effectiveness of the Healthy Beat curriculum through a cost-effective community based program measuring cognitive, behavioral, and biometric improvements.

**Methods:** *Design:* Curriculum development and pre-post assessments for knowledge, anthropometrics, and behavioral changes, were assessed using paired t-tests, one-way ANOVA, and correlations.

*Subjects:* Participants over 18 years of age were recruited in Washington, Beaver, and Sanpete counties of Utah to participate in the seven-session Cooperative Extension heart healthy traditional program approach (with a live teacher). Utah State University Extension Agents were recruited at the Annual Extension conference to complete the courses on CD with phone call or email reminders, and a third group consisted of nutrition education assistants from the Expanded Food and Nutrition Education Program

(EFNEP), who participated in the traditional program (with a live teacher). There were no exclusion criteria, and no participants with terminal illness participated.

**Results:** Significant improvements when including all participants were: overall knowledge of heart healthy nutrients, behaviors and physical activity risk factors for CVD increased from average score on pre test of 15.93 to 18.03 on the post test ($p = < .001$). Average weight at pre-assessment was 185.38 and decreased to average of 182.06 ($p = < .001$), % body fat decreased from 37.46 to 34.90, systolic blood pressure decreased from 125.37 to 121.02, diastolic blood pressure decreased from 84.79 to 81.85, total cholesterol went from 204.07 to 191.82, hip circumference decreased about 1 inch 44.76 to 43.80 and waist circumference decreased 1 inch 38.44 to 37.19 all showed highly significant differences ($p = < .001$). Pulse rate difference was highly significant decreasing from 72.45 to 68.59 ($p = .004$). LDL cholesterol difference was highly significant, lowering from 124.12 to 114.35 ($p = .003$), and 6 minute walk test was also highly significant increasing from 1760.68 to 1899.84 ($p = .001$).

**Conclusions:** The Healthy Beat curriculum and assessment procedures for behavior and knowledge change, is an effective instrument for education and instruction of a heart healthy lifestyle to reduce hypertension, cholesterol, and to increase application of nutrition and physical activity concepts.

## Introduction

Research concludes that cardiovascular disease, stroke, and hypertension involve significant social costs, and that various education programs to decrease their prevalence would lead to social gains (47). Excellent programs have been tested in studies done in inpatient/outpatient hospital settings and community based settings to educate and direct heart healthy behavioral modification, yet for the volume of patients, the number of programs is not sufficient, (48) nor widely distributed in all areas (particularly rural areas).

Since the development of previous intervention programs, research into the heart disease process and specific nutrient benefits has created a need for more emphasis on food portion control, healthy cooking skills, low-fat food preparation, an even greater emphasis on fruit, vegetable, low-fat dairy, and fiber intake, and increased physical activity. There is a lack of comprehensive education programs available that are directed toward decreasing cardiovascular disease (CVD) using the above concepts (47, 49). With increasing availability of education through macromedia and online distance education there is a need for validated, easily distributed programs to be used in various settings that include heart healthy behaviors.

Our objective was to test the effectiveness and usefulness of The Healthy Beat curriculum to improve the health of the Utah population (national population through Extension distribution) through a cost effective community based program that measures cognitive, behavioral, and biometric improvements.

# Materials and Methods

## Curriculum Development

A seven-part curriculum was developed and refined on prevention and treatment of CVD. The curriculum was written for a live presentation format and for DVD or web CT format. The organization of the classes included half hour presentations/discussions of a nutrition or exercise topic followed by setting weekly goals and an interactive cooking demonstration utilizing heart healthy recipes. Four classes that were previously developed by undergraduate dietetic students were revised and enhanced with current information and practices. The content of the first four classes consist of: types of fat in the diet and their effect on serum cholesterol and triglycerides; tips on reducing saturated fats and increasing the proportion of mono or poly unsaturated fats; the effect of fiber, folic acid (its associated affect on homocysteine) and sodium on heart health; tips on healthy snacks and ordering wisley at food establishments; and adapting recipes to decrease saturated fat.

Three additional classes were written and included in the curriculum; two on increasing physical activity, and one on the Dietary Approaches to Stop Hypertension (DASH) diet. Exploration of various patterns/behaviors to increase dietary intake of fruits, vegetables and dairy products were encouraged.

The content of the program was edited and validated for content by Registered Dietitians, Extension agents and University Professors. Each lesson script was edited and reviewed by eight Registered Dietitians in Idaho, New Mexico, and Utah, and the two

lessons on physical activity were edited and reviewed by the head of the Exercise Science department at Utah State University.

The USU Breeze system was utilized to develop and reproduce the electronic version of the curriculum. Breeze is a web communication system that allows communication with an audience through multimedia. Breeze is deployed using Adobe Flash Player [which is already installed on more than 97% of browsers (50)], allowing the participants to view the CD on a majority of office or home computers. *Breeze Presenter* allowed us to narrate PowerPoint and author a self-paced, e-learning course, with future options to support high-impact content, such as video. Breeze also allowed the options of integrating content authored in other Adobe e-learning tools, including Captivate, Authorware, Dreamweaver, and Flash (50), hence, the authoring of CD's can also be accomplished using programs like Flash or Camptasia, that are also available on university campuses. The production process and costs associated with authoring and duplication are discussed in the CD-Rom section of this paper. The Extension Agents received this CD of the curriculum to use at home or at work every other week, at their convenience.

In support of the curriculum, the activities that accompanied each session focused on: encouraging the practice of making healthy choices daily, extending those daily choices into healthy patterns, and personalizing the application of the information gained. Acknowledging the learning process, activities were selected by the fulfillment of criteria to generate *active learning* and not simply memorization of information or facts. Active learning is one of seven principles in learner centered teaching guidelines according to Philips (51) and accompanies the "Taking AIM" guidelines that were published in 1998

(52), to ensure patient education adherence by first "Assessing" the learner, "Identifying" barriers to learning, and "Motivating" participants to make key changes. The topics of the activities are discussed in the content section of this paper.

**Participants**

Participants over the age of 18 were recruited in Washington, Beaver, and Sanpete counties of Utah to participate in the seven-session Cooperative Extension heart healthy curriculum (traditional program with a live teacher). Local newspaper notices and flyers distributed publicly and to physicians clinics advertised the course to those with known CVD (previous myocardial infarction or heart attack (MI), stroke or hypertension), or are at risk for CVD (obesity, type 2 diabetes or a family history of CVD).

Utah State University Extension Agents were recruited at the Annual Extension conference. Initial anthropometric data was collected at the annual meeting and the participants received an introduction and instructions for using the self-paced CD-ROM courses. The follow-up data collection occurred at regional department meetings.

A third group consisting of nutrition education assistants from the Expanded Food and Nutrition Education Program (EFNEP) participated in the heart healthy curriculum in traditional program format (with a live teacher). For each group there were no exclusion criteria, and no participants with terminal illness participated.

**Program Design**

Seventeen participants in Sanpete County, 15 participants in Beaver County, 11 participants in Washington County, and 16 participants from the EFNEP program completed most or all sessions the Healthy Beat program with an education component,

goal setting assignment (such as increasing the level and intensity of personal exercise), and an interactive cooking segment. The program was designed to be taught every other week for a three-month period to allow adequate time to make changes in behavior and apply curriculum. Extended time for data collection was arranged for the first and last class.

After completing the curriculum, the participants came for a final evaluation of skills, blood work, anthropometric measurements, knowledge, and endurance as measured by a 6-minute walking test to assess long-term effectiveness of the program (53). Food demonstrations of heart healthy recipes at each session, in addition to the final blood cholesterol test provided free of cost, were incentives to complete the course for those doing the live teaching sessions.

Fifty-nine Extension Agents in the North, Central, and Southern Regions of the state completed most or all sessions on the CD with the above course information/discussion and PowerPoint presentation. Recipes and realistic scenarios were presented to be as close to a live presentation as possible. Extension Agents were randomized by office/city as to who received phone call reminders every 3 weeks versus phone call *and* email reminders every 3 weeks. This controlled for possible external motivation to complete the sessions from participants who were located in the same office. Reminders were initiated as part of the retention strategy to communicate the importance of each participant to the study.

It was originally proposed that the Extension Agents pay $30 for the tests and DVD. Upon completion of the course content and the two data collection days, the Extension Agents would be reimbursed for their participation. This was to prevent a

high drop-out rate and is supported by current literature (12, 54). For this particular study, the Extension Administration chose not to implement this strategy; however it should not be ruled out for future use of the program. The initial group of "community" participants attended at no cost, whereas the future cost for this program should be $30-$40 per participant, plus teacher salary cost, making it a self-funding program (Appendix A).

Additional incentives for all participants were awarded according to completion of goal setting and achievement. A recipe book entitled "Keep the Beat" from the National Heart, Lung and Blood Institute, and gift certificates to grocery stores/ other healthy food items. Ideas for other possible incentives include free weights, gym passes, or recipe boxes for the heart healthy recipes collected throughout the course.

All participants were given folders to either *bring* each week or to go through on their own each week. These folders provided a method to record that they were setting and following goals, exercise logs, personalized calorie level needs and meal plans, and were also used to organize handouts/recipes received.

**Content**

The content of the curriculum for this program included an introduction to the 2005 Food Guide Pyramid, discussion of weight management, physical activity recommendations, dietary lipid components and the effect of folic acid and homocysteine on CVD and an in-depth review of the effect on the DASH clinical trials and diet plans. Content focus was to assist participants with label reading skills, portion size information, cooking skills to reduce fat/salt and to increase fruit, vegetable, whole grain, and low-fat

dairy products into their diet to reduce risk of CVD (55, 56). Although aging has some interesting statistics when associated with CVD, aging will not be discouraged since the alternative is not attractive or commonly acceptable.

A "Barriers to being active quiz" (56) encouraged participant goal setting for the lessons on increasing physical activity to the recommended levels of 30-60 minutes moderate intensity activity/day. Participants were able to see strengths and weaknesses to determine thier stage of change and personalize the goal setting process. Instructions were provided for participants to calculate individual heart rate and intensity of common activities.

Participants calculated their individual caloric needs using "My Pyramid" (57) and compared the servings to the corresponding caloric level of the DASH diet recommendations (55) to demonstrate that only simple steps were needed to follow both. This activity also demonstrated that increasing fruit and vegetable consumption does not require as much effort as is commonly assumed. By defining portions and comparing what sizes of fruits and vegetables are found in stores it was emphasized that it is realistic to acquire the recommended amount per day.

A collection of various nutrition facts labels were distributed and participants practiced choosing healthy fats/ higher nutrient and fiber content among different brands to enhance label reading skills. The lesson on "Surviving in the real world" epitomized the goal of the Healthy Beat program to transform the information learned into applicable behaviors and healthy habits.

Each lesson script that accompanied the PowerPoint lessons included thought provoking and learning questions. Current research in nutrients, utilization of

macro/micro nutrients, physical activity requirements, clinical practices and other validated recommendations to reduce CVD were evaluated and combined for instruction based on what is accepted by the American Heart Association, National Institutes of Health (NIH), National Heart, Lung, and Blood Institute (NHLBI), and peer reviewed journals. Appendix B provides a reference list of sources that were used in generating the curriculum. Great care was taken to ensure that the same curriculum was taught to each group and that information was neither added nor subtracted. The ideas that would further enhance the program were recorded and will be integrated for future use and distribution of the program.

**CD-ROM**

The main objectives when putting the curriculum content on CD-ROM were to make it "user friendly" and to enhance the learning experience. An opening menu page was created to present organized navigation links to each session, lesson scripts that follow the recorded sessions, learning activities that accompanied the sessions, and additional recipes (Appendix C). Navigation links to "directions for use" and "troubleshooting tips" were also provided. Users also had the ability to open these manually. Color schemes, readable fonts, a learning enhancing interface, clear audio, and overall aesthetic appearance were combined to facilitate effective learning.

Recording audio to accompany the PowerPoint sessions was accomplished using the Breeze system as reported above. University Extension sites have access to Breeze, which allows future classes to be held with on-line meetings. In order to participate, the University purchased a package for $35,000 in 2002, and this initial purchase allowed

Cooperative Extension unlimited access at no cost. Current academic licensing for Breeze with unlimited use is $815,000. USU has made the administrative decision to charge each department $2,000 per year allowing unlimited use for distance education purposes. For Cooperative Extension purposes, which included the development of the Healthy Beat Program, there is no cost. A recording microphone is required (average cost of wireless microphone is $50.00 or PC microphone system is $10.00).

**Data Collection**

The Institutional Review Board at Utah State University approved the Healthy Beat curriculum, promotion of class, research design, and data collection procedures. All study participants provided signed informed consent (Appendix D).

Information was gathered on the participants' age, gender, smoking habits, heart disease risk factors, current dietary and physical activity patterns, education level and income level.

Anthropometric data included height, weight, percent body fat, and body mass index (BMI). Height was measured using a flexible measuring tape posted to a wall with the ability to measure at 1/4 inch increments. Weight was measured using a *Cardinal* Detecto Scale (model: 758C) for the three counties and Secca Scale (model: 880) for Extension Agents. Body fat percentages were measured using a bioelectrical impedance scale (model: Taylor Body Fat Analyzer 5563). BMI was calculated using weight (kg) divided by height (m) squared. Waist and hip circumferences were measured also with a flexible measuring tape to the nearest ¼ inch.

Biochemical data included total cholesterol, LDL and HDL cholesterol, LDL/HDL cholesterol ratio, and triglyceride levels. Serum lipid levels were evaluated using a Cholestech LDX machine. Upon registration for the class, participants were asked to come fasting (no food within the last 8-12 hours, yet water was allowed and encouraged to prevent dehydration) on data collection days to ensure accuracy of lipid panel measurements. Systolic and diastolic blood pressure was measured in the right arm with an appropriate sized cuff using an Omron HEM 711AC, automatic blood pressure monitor.

A 32-question, written, multiple choice test, (pre and post format) was administered at the beginning and at the end of the program to determine nutrition, exercise, and risk for heart disease knowledge. At the end of the course participants were given a *self-evaluation* of their knowledge/ability/behavior/actions with a before-after course questionnaire format. The knowledge tests and self-evaluation (Appendix E) received content validity from nutritionists, Registered Dietitians, and Extension Agents in Utah and Idaho.

A 6-minute walk test was performed at the beginning and conclusion of the study by only two groups of participants in the live session teaching approach, and the EFNEP participants. The distance walked (not ran) was measured to determine increase in physical endurance and fitness (1, 53). Due to lack of feasibility and time constraints on data collection periods, the group taking the courses on CD did not do the 6-minute walk test. All participants were asked to track exercise using the logs provided, and set goals for increasing exercise on an individual basis. Achievement of this goal was to be evaluated by the six-minute walk test and the self-evaluation questionnaire administered

at the conclusion of the study. If a participant was unable to walk or walk for 6 minutes, the assessment was not required.

A satisfaction survey was developed and distributed to study participants at the end of the study (Appendix F). The principal investigator, co-investigators, and graduate student calculated time and resources for this study to determine cost-effectiveness of methods for providing this program and is reported in Chapter 3.

Attention was given to the dates of initial and final data collections to achieve as much consistency as possible, and to ensure adequate time for realistic behavior and dietary improvements. The participants in the CD group were to complete the courses every other week for three months. The live session groups in the three counties completed the course in 9-10 weeks, (2.5 months), which is sufficient to allow for change according to the AHA (17).

**Statistical Analysis**

Data were analyzed using the Statistical Package for the Social Science (SPSS™ version 14). Paired t-tests, grouped t-tests, ANOVA, and correlations were used to identify and compare significant differences of cognitive, behavioral, and biometric improvements between the live participant groups vs. CD group. Frequencies were run for all variables and correlations between pre and post total score and pre and post anthropometrics and lipid panel were conducted.

# Results

## Preliminary Data

Nine subjects completed a 4-week healthy heart curriculum developed in 2003 by senior Utah State University dietetic students. The course was effective in increasing knowledge, behavior and self-perceived knowledge as assessed from pre and post test scores. The average score on the knowledge pre test was 13.63 out of 20, which increased to 17.0 on the post test. It was concluded that the curriculum was well structured, stringent, and participatory in nature; however, food portioning skills are developed over a longer period of time. Self-perceived knowledge also improved from 2.78 to 4.00 on a scale of 1 – 5. Participants of all ages experienced the same level of improvement for the knowledge test and the self perceived knowledge evaluation.

Behavior also improved as knowledge improved ($r^2 = 0.932$, $p = 0.001$). On a scale of 1 – 5, (1 indicating participants had "never taken this action" and 5 indicating "have incorporated this action daily"), subjects entered the class with an average score of 2.50 on self-perceived behavior habits. The average score rose to 3.96 upon completion of the classes. The four classes were taught every week for 1 month, which did not provide enough time to evaluate the effect of the program on weight loss or serum lipid levels.

## Current Data

Seventeen participants from Sanpete County, 15 from Beaver County, 11 from Washington County, 59 Extension agents and 16 from the EFNEP group completed the seven-part Healthy Beat curriculum. Fourteen out of 73 (19%) participants that initially participated for data collection in the live traditional setting, and 14 out of 74 (18.9%)

participants in the CD group, failed to complete the curriculum and/or the final data collection. In both groups, there was a larger participant drop-out rate in the Southern regions due to feasibility of collecting data if the scheduled time for final data collection was missed.

Paired t-tests were used to evaluate overall change in knowledge, anthropometric indices, and behaviors (see Table 2-1). Significant improvements when including all participants were: overall knowledge of heart healthy nutrients, behaviors and physical activity risk factors for CVD increased from average score on pre test of 15.93 to 18.03 on the post test ($p = < .001$). Average weight at pre-assessment was 185.38 and decreased to average of 182.06 ($p = < .001$), % body fat decreased from 37.46% to 34.90%, systolic blood pressure decreased from 125.37 mmHg to 121.02 mmHg, diastolic blood pressure decreased from 84.79 mmHg to 81.85 mmHg, total cholesterol went from 204.07 to 191.82, hip circumference decreased about 1 inch 44.76 to 43.80 and waist circumference decreased 1 inch 38.44 to 37.19 all showed highly significant differences ($p = < .001$). Pulse rate difference was highly significant decreasing from 72.45 to 68.59 ($p = .004$). LDL cholesterol difference was highly significant, lowering from 124.12 to 114.35 ($p = .003$), and 6-minute walk test was also highly significant increasing from 1760.68 ft to 1899.84 ft ($p = .001$).

Overall average for behavior change in all participants increased from 15.94 to 18.03 with highly significant behavior changes in "reading or looking at food labels" ($p = < .001$), "following a heart healthy diet was not difficult" ($p = .001$), "heart healthy recipe substitutions" ($p = < .001$), and "awareness of cholesterol numbers and what they mean" ($p = < .001$). Diet instruction was highly significant from pre to post assessment

(p = . 004) with more participants seeking instruction from EFNEP/WIC (p = .018), Registered Dietitian (p = .005), Nurse (p = .02), and "other" (p = .011). Behavior changes by group are separated out and reported in Appendix G. More specifically, when looking at percentages of questions answered wrong the first time compared to answering correctly the second time, post-test knowledge improved with knowing which type of cholesterol is the "good" cholesterol (31.3%), healthy cholesterol levels (17.5%), type of fat in olive and canola oils (29.3%), functions of fiber (22.6%), folic acid to decrease heart disease risk (28.3%), healthy food choices to decrease fat (18%), and components of the DASH diet (19.6%).

Participants appeared to have a higher perception of the knowledge gained through the program (as indicated on the before/after class evaluation) than is reflected by the pre/post test scores. There was a highly significant change in before/after course knowledge and behaviors as reported by participants with average increasing from 39.94 to 57.83 (p = < .001), compared to actual knowledge, behavior, anthropometric and biochemical changes (see Table 2-2).

For all participants with previously known hypertension, there was significant difference in the 6-minute walk test (F = .251, p = < .05), and no significant difference in knowledge test, blood pressure, lipids, or other anthropometric indices. For those with previously known hypercholesterolemia, or a strong family history of heart disease, there were no significant differences in the knowledge test, blood pressure, lipids, or other anthropometric indices. For those who were unsure of family history or existing disease there was a significant difference in systolic blood pressure (F = .015, p = .013), and a highly significant difference in diastolic blood pressure (F = .230, p = .007). Participants

who had previously been advised by a physician to seek help in lowering cholesterol, hypertension, and risk for heart condition, there was highly significant difference in HDL cholesterol level ($F = .207$, $p = .009$), and no significance in other lipids, anthropometrics or knowledge change.

Correlations were calculated to further compare results. Initial and final anthropometrics and biochemical data were compared to knowledge change and post score to see if education impacted results. A decrease in total cholesterol was positively correlated with knowledge increase ($r = .255$, $p = .02$) (Table 2-3). The number of classes attended or viewed on CD was highly correlated with knowledge increase ($r = .312$, $p = .004$), and self evaluation increase ($r = .355$, $p = < .001$). There were also significant correlations of classes attended with weight decrease ($r = .232$, $p = .013$), and decrease in BMI ($r = .233$, $p = .013$) (see Table 2-3). Factors that were not significant, but showed trends in data and are still positively or negatively correlated with knowledge change, number of classes attended, or the 6-minute walk test, are also reported in Table 2-3. For example as test scores increased, blood pressure, pulse rate and hip circumference decreased. As the number of classes attended increased, % body fat and triglycerides decreased. Although the 6-minute walk test significantly improved, there were no significant correlations between the 6-minute walk test and changes in risk factors.

Table 2-4 also shows correlations between education, income, physical activity levels and previous heart healthy practices. There were highly significant correlations between education level and weight decrease ($r = -.279$, $p = .005$), BMI decrease ($r = -.261$, $p = .009$), self evaluation increase ($r = -.386$, $p = < .001$), and amount of classes

attended or viewed ($r = -.380$, $p = < .001$). Previous heart healthy practices were highly correlated with classes attended or viewed. Significant correlations existed between level of physical activity and weight decrease ($r = .205$, $p = .042$), and BMI decrease ($r = .210$, $p = .037$). Significant correlation also existed between education level and hip circumference decrease ($r = .250$, $p = .012$).

Table 2-5 shows knowledge, anthropometric, biochemical, and evaluation changes for the live presentation group, CD group, and EFNEP group individually. It appears that the participants in the live participation group had significantly increased test and evaluation scores compared to the CD group ($p = .014$). The CD participation group, however, had more highly significant differences in anthropometrics and biochemical changes than the live participation group as follows: weight decreased almost 5 pounds for the CD group and almost 2 pounds for the live ($p = .002$), BMI decreased .754 for CD group and .325 for live participation group ($p = .003$), and pulse rate decreased 7.08 beats per minute in CD group and increased 1.3 in live participation group ($p = .004$). Other trends are noted by examining means.

EFNEP participants as a separate group (see Table 2-6), had significant change in knowledge from pre-assessment average of 17.63 to post-assessment average of 19.36 ($p = .042$), however not as significant as the other two groups. There were no significant changes in anthropometric indices, or lipid panel; however, the before/after evaluation of the course and what they perceived to change or learn was highly significant with an average of 43.93 out of 70 on pre-assessment to an average of 61.20 out of 70 on the post assessment ($p = < .001$).

Trends in data showed that those participants in the CD group who received only email reminders (marked with a "1"), performed as well as those who received email and phone call reminders (marked with a "2"). There was a very significant difference in total cholesterol for those who only received one reminder ($p = .007$). There was an overall difference in gender for knowledge before program ($p = .005$), and after program ($p = .043$). Average pre-score was 14.66 for males and 16.37 for females and increased to average post scores of 16.97 for males and 18.17 for females, however no significant difference in gender for blood pressure, lipid panel, or other anthropometric indices.

## Discussion

Strong trends in data were evident, even though there were minimal significant correlations due to sensitivity of sample size. Previous knowledge or existence of hypertension, hypercholesterolemia and/or family history of heart disease, and existing risk factors did not appear to be a strong motivator to change heart disease risk factors in these groups. It appeared that participants had a higher perceived knowledge and behavior increase than was reflected by final data collection and test scores. Taking into account the feasibility of calling participants and/or emailing them, it appears that using one type of reminder is just as effective as using two types of reminders simultaneously.

After evaluating the post anthropometrics and biochemical results, it appeared that even though it was reported that participants were fasting, the triglycerides were unchanged or even higher. Other data seemed to improve, however, which makes the rise in triglycerides unexplainable. The curriculum strongly focused on cholesterol-lowering techniques, which could explain the positive correlation between knowledge

increase and total cholesterol decrease. It appears that if the participants set goals to achieve risk reduction in one area, positive results were seen in other areas as well. For example when weight is reduced it is more likely that body fat, hip, and waist circumference can also decrease. An increase in the participants' endurance test generally led to lower blood pressure and lower pulse rate. Increased endurance also leads to a stronger increase in HDL cholesterol which did not occur in our population.

Even though EFNEP participants were taught in a live traditional setting, it was necessary to evaluate the group as a separate third group due to the fact that it consisted of female participants only who had a higher knowledge of nutrition concepts and who generally proved to be healthier to start with. Due to this factor, there was not as much significant change in knowledge, behavior, anthropometrics, or lipids except for triglycerides which were significantly higher at final data collection. This could be due to the fact that for this group, the magnitude of change was less from the beginning and they were comfortable with their knowledge and behaviors. Even though it seemed that they took action, (as evidenced by high before/after evaluations and improved endurance in the 6-minute walk test), it was not as significant compared to other groups. It appeared that in all three groups, women had greater knowledge prior to, and after, taking the course than did males.

It was felt that this program was very effective in assisting participants to become aware of CVD risk factors and how to modify them. This was evident with a knowledge increase from pre test of 15.93 to 18.03, an average weight decrease of 5 pounds for the participants in the CD group, and 2 pounds for the live participation group, total cholesterol decrease of 18 point for the CD group and 8 for the live participation group,

waist circumference reduced about 1 inch, and hip circumference also being reduced 1 inch. Equally important was the satisfaction with the course and the motivation that was initiated to establish heart healthy habits as evidenced by the final evaluations.

## Conclusion and Application for Practitioners

### Future Curriculum Development and Course Procedures

Future curriculum should include a brief discussion on smoking cessation, menopause and oral contraceptive use in relation to heart disease. A section devoted to "Choosing Heart Healthy options for traveler's on the go" would also be beneficial as it is becoming more common for employees to travel. Future editions will also incorporate a pre and post food portioning skills assessment.

It is recommended that a system be incorporated to check communication of goal setting each week to ensure that the ideas and behaviors taught will continue after the course is complete. This will provide more focus for setting goals by having participants report each week and possibly enter a drawing for prizes.

As pertaining to documentation of the course, it would more accurately reflect the class before/after self perceived evaluation if the instructor of the course pointed out that this is specifically evaluating their perceived knowledge and that the accompanying survey is what they use to express their opinion of the class according to what was taught and learned.

**Future Data Collection**

Time, resources, and expertise availability for data collection need to be considered to determine the utilization of either a 3-day dietary recall or food frequency questionnaire to assess dietary intakes. A 3-day dietary recall record (two weekdays and one weekend day) can be obtained from each participant at the beginning and conclusion of the study to determine folic acid intake, saturated fat, cholesterol and other nutrients. Using this method would extend data collection periods and require trained individuals to collect and assess information. Depending on the population being observed, and the design of the program, Food Frequency Questionnaires may provide equal to or even greater evaluation of dietary intakes and patterns by measuring usual intake before and after the study to measure change (58). The purpose of a folic acid intake and analysis would be to assess and determine risk for elevated homocysteine level in relation to risk for CVD.

The Healthy Beat curriculum and assessment procedures for behavior and knowledge change, is an effective instrument for education and instruction of a heart healthy lifestyle to reduce hypertension, cholesterol, and to increase application of nutrition and physical activity concepts.

**Table 2-1**. Paired t-tests for Changes in Knowledge, Anthropometrics, and Behavior for all participants combined.

| Group | Variable | Mean | Std. Deviation | t | Sig. |
|---|---|---|---|---|---|
| **Live** | **prescore - postscore** | -3.45455 | 2.63181 | -6.157 | 0 |
| **CD** | **prescore - postscore** | -1.58 | 3.01757 | -3.702 | 0.001 |
| **EFNEP** | **prescore - postscore** | -1.72727 | 2.4532 | -2.335 | 0.042 |

| Variable | Mean | N | Std. Deviation | t | Sig. |
|---|---|---|---|---|---|
| **Weight 1** | 185.381 | 116 | 42.828 | 7.842 | p = < .001 |
| **Weight 2** | 182.064 | 116 | 42.139 | | |
| **BMI 1** | 29.815 | 116 | 6.367 | 7.937 | p = < .001 |
| **BMI 2** | 29.297 | 116 | 6.339 | | |
| **Body Fat 1** | 37.464 | 55 | 7.906 | 6.539 | p = < .001 |
| **Body Fat 2** | 34.909 | 55 | 7.374 | | |
| **Systolic 1** | 125.373 | 110 | 15.974 | 3.666 | p = < .001 |
| **Systolic2** | 121.018 | 110 | 15.575 | | |
| **Diastolic 1** | 84.791 | 110 | 10.981 | 3.947 | p = < .001 |
| **Diastolic 2** | 81.846 | 110 | 10.168 | | |
| **pulse rate 1** | 72.454 | 97 | 14.316 | 2.961 | p = .004 |
| **pulse rate 2** | 68.588 | 97 | 11.464 | | |
| **Total cholesterol 1** | 204.076 | 118 | 39.178 | 4.436 | p = < .001 |
| **Total cholesterol 2** | 191.822 | 118 | 39.217 | | |
| **LDL 1** | 124.115 | 111 | 39.276 | 3.067 | p = .003 |
| **LDL 2** | 114.351 | 111 | 35.840 | | |
| **HDL 1** | 45.026 | 114 | 15.548 | 1.738 | p = .085 |
| **HDL 2** | 43.097 | 114 | 15.364 | | |
| **Trigs 1** | 175.222 | 117 | 115.322 | 0.031 | p = .976 |
| **Trigs 2** | 174.897 | 117 | 103.711 | | |
| **Hip Circum 1** | 44.761 | 116 | 4.882 | 7.838 | p = < .001 |
| **Hip Circum 2** | 43.801 | 116 | 4.919 | | |
| **Waist Circum 1** | 38.439 | 116 | 6.487 | 4.057 | p = < .001 |
| **Waist Circum 2** | 37.186 | 116 | 6.967 | | |
| **6-minute walk 1** | 1760.676 | 37 | 329.089 | -3.667 | p = .001 |
| **6-minute walk 2** | 1899.838 | 37 | 347.294 | | |

| Table 2-1 continued. | | | | | | |
|---|---|---|---|---|---|---|
| | | **Mean** | **N** | **Std. Deviation** | **t** | **Sig.** |
| **Overall Behavior** | **prescore** | 15.940 | 83 | 3.005 | -6.503 | p = .000 |
| | **postscore** | 18.036 | 83 | 2.666 | | |
| **Read Labels** | **pre22** | 2.530 | 116 | 0.849 | -3.882 | p = .000 |
| | **post22** | 2.830 | 116 | 0.749 | | |
| **Diet instruction** | **pre23** | 1.770 | 117 | 0.423 | 2.918 | p = .004 |
| | **post23** | 1.630 | 117 | 0.484 | | |
| **Instructed By:** | | | | | | |
| **College course** | **pre24a** | 0.51 | 105 | 0.845 | -1.879 | p = .063 |
| | **post24a** | 0.69 | 105 | 0.88 | | |
| **EFNEP/WIC course** | **pre24b** | 0.5 | 105 | 0.833 | -2.405 | p = .018 |
| | **post24b** | 0.74 | 105 | 0.931 | | |
| **Registered Dietitian** | **pre24c** | 0.48 | 105 | 0.798 | -2.901 | p = .005 |
| | **post24c** | 0.75 | 105 | 0.938 | | |
| **Physician** | **pre24d** | 0.51 | 105 | 0.845 | -1.976 | p = .051 |
| | **post24d** | 0.7 | 105 | 0.889 | | |
| **Nurse** | **pre24e** | 0.56 | 105 | 0.898 | -2.361 | p = .020 |
| | **post24e** | 0.8 | 105 | 0.975 | | |
| **Other** | **pre24f** | 0.5 | 105 | 0.833 | -2.579 | p = .011 |
| | **post24f** | 0.74 | 105 | 0.931 | | |
| **What makes following a heart healthy diet difficult?** | | | | | | |
| **Time** | **pre25a** | 1.52 | 108 | 0.502 | 0.376 | p = .707 |
| | **post25a** | 1.5 | 108 | 0.502 | | |
| **Expense** | **pre25b** | 1.85 | 108 | 0.357 | 1.921 | p = .057 |
| | **post25b** | 1.8 | 108 | 0.405 | | |
| **Support** | **pre25c** | 1.82 | 108 | 0.383 | -0.904 | p = .368 |
| | **post25c** | 1.85 | 108 | 0.357 | | |
| **Complicated** | **pre25d** | 1.81 | 108 | 0.398 | -3.464 | p = .001 |
| | **post25d** | 1.94 | 108 | 0.247 | | |
| **No Benefits** | **pre25e** | 1.99 | 108 | 0.096 | 0.576 | p = .566 |
| | **post25e** | 1.98 | 108 | 0.135 | | |
| **Restrictive** | **pre25f** | 1.87 | 108 | 0.337 | -1.393 | p = .167 |
| | **post25f** | 1.92 | 108 | 0.278 | | |
| **Other** | **pre25g** | 1.79 | 108 | 0.411 | -0.705 | p = .482 |
| | **post25g** | 1.82 | 108 | 0.383 | | |
| **It is NOT difficult** | **pre25h** | 1.81 | 108 | 0.39 | 0.726 | p = .469 |
| | **post25h** | 1.79 | 108 | 0.411 | | |
| | | | | | | |
| **Make recipe substitutions** | **pre26** | 1.98 | 116 | 0.71 | -5.354 | p = .000 |
| | **post26** | 2.29 | 116 | 0.698 | | |
| **Family History** | **pre27** | 1.48 | 114 | 0.502 | 1.615 | p = .109 |
| | **post27** | 1.43 | 114 | 0.497 | | |
| **Awareness of cholesterol #'s and what they mean** | **pre28** | 1.6 | 107 | 0.493 | 9.218 | p = .000 |
| | **post28** | 1.1 | 107 | 0.305 | | |

**Table 2-2.** Correlations of perceived results (as indicated by self evaluation) vs. actual results.

| Change in Variable: | | Self Evaluation | Post Score | Knowledge Change |
|---|---|---|---|---|
| weight | Pearson Correlation | 0.077 | 0.068 | 0.062 |
| | Sig. (2-tailed) | 0.419 | 0.496 | 0.583 |
| | N | 112 | 103 | 81 |
| BMI | Pearson Correlation | 0.073 | 0.064 | 0.063 |
| | Sig. (2-tailed) | 0.447 | 0.521 | 0.573 |
| | N | 112 | 103 | 81 |
| % body fat | Pearson Correlation | -0.337 | -0.145 | -0.016 |
| | Sig. (2-tailed) | 0.013 | 0.337 | 0.929 |
| | N | 54 | 46 | 32 |
| systolic | Pearson Correlation | 0.115 | 0.039 | 0.093 |
| | Sig. (2-tailed) | 0.239 | 0.707 | 0.424 |
| | N | 107 | 97 | 76 |
| diastolic | Pearson Correlation | -0.083 | -0.075 | 0.076 |
| | Sig. (2-tailed) | 0.394 | 0.465 | 0.514 |
| | N | 107 | 97 | 76 |
| pulse rate | Pearson Correlation | -0.021 | 0.072 | -0.096 |
| | Sig. (2-tailed) | 0.843 | 0.509 | 0.427 |
| | N | 94 | 87 | 70 |
| total cholesterol | Pearson Correlation | 0.148 | -0.051 | -0.255 |
| | Sig. (2-tailed) | 0.117 | 0.604 | 0.02 |
| | N | 114 | 105 | 83 |
| LDL | Pearson Correlation | 0.045 | -0.136 | -0.181 |
| | Sig. (2-tailed) | 0.645 | 0.18 | 0.111 |
| | N | 107 | 98 | 79 |
| HDL | Pearson Correlation | 0.044 | 0.027 | -0.217 |
| | Sig. (2-tailed) | 0.647 | 0.792 | 0.053 |
| | N | 110 | 101 | 80 |
| triglycerides | Pearson Correlation | 0.073 | -0.001 | -0.035 |
| | Sig. (2-tailed) | 0.442 | 0.989 | 0.752 |
| | N | 113 | 104 | 82 |
| hip circumference | Pearson Correlation | 0.044 | -0.132 | 0.046 |
| | Sig. (2-tailed) | 0.643 | 0.182 | 0.68 |
| | N | 112 | 103 | 81 |
| waist circumference | Pearson Correlation | -0.142 | -0.018 | -0.082 |
| | Sig. (2-tailed) | 0.135 | 0.86 | 0.466 |
| | N | 112 | 103 | 81 |
| 6-minute walk | Pearson Correlation | -0.254 | -0.092 | 0.236 |
| | Sig. (2-tailed) | 0.129 | 0.615 | 0.256 |
| | N | 37 | 32 | 25 |

**Table 2-3.** Impact of education on change in factors

| Change in: | | Self Evaluation | Knowledge Change | 6-minute walk | Classes Attended |
|---|---|---|---|---|---|
| weight | Pearson Correlation | -0.066 | 0.062 | -0.024 | 0.232 |
| | Sig. (2-tailed) | 0.493 | 0.583 | 0.889 | 0.013 |
| | N | 109 | 81 | 37 | 113 |
| BMI | Pearson Correlation | -0.067 | 0.063 | -0.049 | 0.233 |
| | Sig. (2-tailed) | 0.489 | 0.573 | 0.773 | 0.013 |
| | N | 109 | 81 | 37 | 113 |
| % body fat | Pearson Correlation | -0.021 | 0.016 | -0.021 | -0.022 |
| | Sig. (2-tailed) | 0.883 | 0.929 | 0.9 | 0.875 |
| | N | 53 | 32 | 37 | 54 |
| systolic | Pearson Correlation | -0.051 | -0.093 | 0.182 | 0.127 |
| | Sig. (2-tailed) | 0.608 | 0.424 | 0.304 | 0.191 |
| | N | 104 | 76 | 34 | 108 |
| diastolic | Pearson Correlation | -0.171 | -0.076 | 0.087 | 0.039 |
| | Sig. (2-tailed) | 0.083 | 0.514 | 0.623 | 0.692 |
| | N | 104 | 76 | 34 | 108 |
| pulse rate | Pearson Correlation | 0.118 | 0.096 | 0.118 | 0.086 |
| | Sig. (2-tailed) | 0.265 | 0.427 | 0.513 | 0.405 |
| | N | 92 | 70 | 33 | 96 |
| total cholesterol | Pearson Correlation | 0.013 | 0.255 | 0.026 | 0.083 |
| | Sig. (2-tailed) | 0.89 | 0.02 | 0.88 | 0.379 |
| | N | 111 | 83 | 37 | 115 |
| LDL | Pearson Correlation | 0.018 | 0.181 | 0.066 | 0.152 |
| | Sig. (2-tailed) | 0.853 | 0.111 | 0.701 | 0.116 |
| | N | 104 | 79 | 36 | 108 |
| HDL | Pearson Correlation | 0.058 | 0.217 | -0.128 | 0.025 |
| | Sig. (2-tailed) | 0.55 | 0.053 | 0.457 | 0.796 |
| | N | 107 | 80 | 36 | 111 |
| triglycerides | Pearson Correlation | -0.049 | 0.035 | -0.305 | -0.031 |
| | Sig. (2-tailed) | 0.615 | 0.752 | 0.067 | 0.742 |
| | N | 110 | 82 | 37 | 114 |
| hip circum. | Pearson Correlation | -0.107 | -0.046 | 0.211 | 0.028 |
| | Sig. (2-tailed) | 0.267 | 0.68 | 0.211 | 0.766 |
| | N | 109 | 81 | 37 | 114 |
| waist circum. | Pearson Correlation | 0.09 | 0.082 | 0.129 | 0.161 |
| | Sig. (2-tailed) | 0.352 | 0.466 | 0.446 | 0.087 |
| | N | 109 | 81 | 37 | 114 |
| 6-minute walk | Pearson Correlation | 0.103 | -0.236 | | 0.182 |
| | Sig. (2-tailed) | 0.551 | 0.256 | | 0.281 |
| | N | 36 | 25 | | 37 |

**Table 2-4.** Correlations between level of education, income, physical activity, and previous heart health practices with changes in factors.

| Change in: | | Education Level | Income Level | Physical Activity Level | Previous Heart Healthy Practices |
|---|---|---|---|---|---|
| weight | Pearson Correlation | -0.279 | -0.018 | 0.205 | 0.097 |
| | Sig. (2-tailed) | 0.005 | 0.859 | 0.042 | 0.374 |
| | N | 100 | 96 | 99 | 86 |
| BMI | Pearson Correlation | -0.261 | 0.015 | 0.210 | 0.079 |
| | Sig. (2-tailed) | 0.009 | 0.882 | 0.037 | 0.467 |
| | N | 100 | 96 | 99 | 86 |
| % body fat | Pearson Correlation | -0.170 | 0.090 | 0.053 | 0.027 |
| | Sig. (2-tailed) | 0.301 | 0.595 | 0.748 | 0.873 |
| | N | 39 | 37 | 39 | 38 |
| systolic | Pearson Correlation | -0.064 | -0.061 | -0.051 | 0.037 |
| | Sig. (2-tailed) | 0.541 | 0.565 | 0.629 | 0.747 |
| | N | 94 | 90 | 93 | 80 |
| diastolic | Pearson Correlation | 0.066 | -0.054 | -0.005 | 0.013 |
| | Sig. (2-tailed) | 0.525 | 0.615 | 0.964 | 0.908 |
| | N | 94 | 90 | 93 | 80 |
| pulse rate | Pearson Correlation | -0.213 | 0.061 | -0.188 | -0.099 |
| | Sig. (2-tailed) | 0.055 | 0.592 | 0.092 | 0.413 |
| | N | 82 | 79 | 81 | 70 |
| total cholesterol | Pearson Correlation | -0.159 | 0.074 | -0.122 | 0.039 |
| | Sig. (2-tailed) | 0.111 | 0.469 | 0.222 | 0.719 |
| | N | 102 | 98 | 101 | 87 |
| LDL | Pearson Correlation | -0.010 | 0.022 | -0.091 | 0.070 |
| | Sig. (2-tailed) | 0.922 | 0.839 | 0.382 | 0.535 |
| | N | 95 | 91 | 95 | 81 |
| HDL | Pearson Correlation | -0.187 | -0.007 | -0.022 | 0.174 |
| | Sig. (2-tailed) | 0.065 | 0.943 | 0.832 | 0.114 |
| | N | 98 | 94 | 98 | 84 |
| triglycerides | Pearson Correlation | -0.142 | 0.158 | 0.013 | 0.066 |
| | Sig. (2-tailed) | 0.156 | 0.121 | 0.894 | 0.547 |
| | N | 101 | 97 | 100 | 86 |
| hip circum. | Pearson Correlation | 0.250 | 0.191 | 0.000 | -0.021 |
| | Sig. (2-tailed) | 0.012 | 0.062 | 0.998 | 0.849 |
| | N | 100 | 96 | 99 | 86 |
| waist circum. | Pearson Correlation | 0.000 | -0.150 | -0.109 | 0.113 |
| | Sig. (2-tailed) | 0.998 | 0.146 | 0.285 | 0.300 |
| | N | 100 | 96 | 99 | 86 |
| self evaluation | Pearson Correlation | -0.386 | -0.147 | 0.027 | -0.054 |
| | Sig. (2-tailed) | 0.000 | 0.160 | 0.795 | 0.625 |
| | N | 98 | 93 | 96 | 84 |
| knowledge | Pearson Correlation | -0.213 | 0.092 | 0.068 | 0.143 |
| | Sig. (2-tailed) | 0.073 | 0.454 | 0.570 | 0.276 |
| | N | 72 | 69 | 72 | 60 |
| 6-min walk | Pearson Correlation | 0.226 | -0.021 | -0.241 | -0.363 |
| | Sig. (2-tailed) | 0.300 | 0.929 | 0.268 | 0.089 |
| | N | 23 | 21 | 23 | 23 |
| classes veiwed | Pearson Correlation | -0.380 | -0.035 | -0.055 | 0.290 |
| | Sig. (2-tailed) | 0.000 | 0.734 | 0.592 | 0.007 |
| | N | 100 | 95 | 98 | 84 |

**Table 2-5**. Comparison of knowledge, anthropometric, lipid panel, evaluation change for the live participation and CD groups.

| Change in variable: | group | N | Mean | Std. Deviation | F | Sig. |
|---|---|---|---|---|---|---|
| **weight** | **Live** | 41 | -1.999 | 4.042 | 2.154** | 0.002 |
| | **CD** | 58 | -4.928 | 4.839 | | |
| **BMI** | **Live** | 42 | -0.325 | 0.666 | 1.232** | 0.003 |
| | **CD** | 58 | -0.754 | 0.724 | | |
| **bodyfat** | **Live** | 39 | -3.346 | 2.889 | . | . |
| | **CD** | 0(a) | . | . | | |
| **systolic** | **Live** | 39 | -5.949 | 14.684 | 3.494 | 0.868 |
| | **CD** | 55 | -5.527 | 9.852 | | |
| **diastolic** | **Live** | 39 | -5.308 | 8.367 | 0.325 | 0.051 |
| | **CD** | 55 | -2.091 | 7.316 | | |
| **pulse rate** | **Live** | 34 | 1.294 | 16.765 | 2.673** | 0.004 |
| | **CD** | 48 | -7.083 | 8.982 | | |
| **total cholesterol** | **Live** | 43 | -8.767 | 27.955 | 2.161 | 0.13 |
| | **CD** | 59 | -18.017 | 31.776 | | |
| **LDL** | **Live** | 39 | -5.415 | 32.858 | 0.087 | 0.27 |
| | **CD** | 56 | -12.939 | 32.254 | | |
| **HDL** | **Live** | 41 | 0.049 | 13.995 | 2.335 | 0.154 |
| | **CD** | 57 | -3.544 | 10.775 | | |
| **triglycerides** | **Live** | 43 | -15.744 | 126.420 | 0.209 | 0.605 |
| | **CD** | 58 | -3.586 | 108.316 | | |
| **hip circumference** | **Live** | 43 | -1.279 | 1.438 | 0.867 | 0.106 |
| | **CD** | 57 | -0.838 | 1.261 | | |
| **waist circumference** | **Live** | 43 | -1.345 | 0.926 | 2.473 | 0.85 |
| | **CD** | 57 | -1.481 | 4.613 | | |
| **6 minute walk** | **Live** | 23 | 136.957 | 225.367 | . | . |
| | **CD** | 0(a) | . | . | | |
| **Self Evaluation** | **Live** | 44 | 23.159 | 9.106 | 0.225** | 0 |
| | **CD** | 54 | 13.778 | 8.564 | | |
| **Pre-post test scores** | **Live** | 22 | 3.455 | 2.632 | 0.77* | 0.014 |
| | **CD** | 50 | 1.580 | 3.018 | | |

a. t cannot be computed because at least one of the groups is empty.

* significant p Values

** highly significant p Values

**Table 2-6.** Comparison of knowledge, anthropometric, lipid panel, evaluation change for the EFNEP group.

| Change in variable: | N | Mean | Std. Deviation | t | df | Sig. |
|---|---|---|---|---|---|---|
| **weight** | 16 | 0.939 | 2.129 | 1.763 | 15 | 0.098 |
| **BMI** | 16 | 0.169 | 0.364 | 1.853 | 15 | 0.084 |
| **% body fat** | 16 | 0.625 | 1.866 | 1.339 | 15 | 0.2 |
| **systolic** | 16 | -3.563 | 12.393 | -1.15 | 15 | 0.268 |
| **diastolic** | 16 | 0.125 | 7.023 | 0.071 | 15 | 0.944 |
| **pulse rate** | 15 | 5.267 | 9.917 | 2.057 | 14 | 0.059 |
| **total cholesterol** | 16 | 0.375 | 24.803 | 0.06 | 15 | 0.953 |
| **LDL** | 16 | 9.250 | 40.164 | 0.921 | 15 | 0.372 |
| **HDL** | 16 | 1.250 | 9.066 | 0.551 | 15 | 0.589 |
| **triglycerides** | 16 | -52.938 | 95.492 | -2.335 | 15 | 0.042 |
| **hip circumference** | 16 | 0.538 | 1.034 | 2.079 | 15 | 0.055 |
| **waist circumference** | 16 | 0.194 | 1.244 | 0.623 | 15 | 0.542 |
| **6 minute walk** | 14 | -142.786 | 248.193 | -2.153 | 13 | 0.051 |
| **Self Evaluation** | 15 | -17.267 | 9.362 | 7.143** | 14 | 0 |
| **Pre-post test scores** | 11 | -1.727 | 2.453 | 2.335* | 10 | 0.042 |

* significant p Values

** highly significant p Values

# CHAPTER 3

# COSTS ASSOCIATED WITH CD-ROM FORMAT VERSUS LIVE PRESENTATION OF THE HEALTHY BEAT CURRICULUM

## Abstract

**Background:** Excellent programs are available for education and direction of heart healthy behavior modification, yet for the volume of patients, the number of programs is not sufficient, nor widely distributed in all areas (particularly rural areas). This paper will examine and report the costs of developing a university extension-sponsored, community-based, cardiovascular program and the benefits thereof, compared to average costs of hospitalizations and treatments for cardiovascular disease and the implications thereof, for future use or development of such programs.

**Objective:** To compare the estimated costs, combined with actual costs of curriculum development and teaching, to available data of annual costs of hospitalizations, medications, and office visits for physicians or other professionals for heart disease, high blood pressure, and stroke.

**Methods:** Average costs of initial curriculum and CD development, program implementation including salaries, estimated direct and indirect costs for cardiovascular diseases and stroke for 2006, and potential cost savings on medications and hospitalizations, per participant, after using such a program were calculated and/or reported. The costs were calculated for a program consisting of participants over the age of 18 that were recruited in three Utah counties (n = 43) to participate in the seven-session Cooperative Extension heart healthy traditional program approach (with a live

teacher), 59 Utah State University Extension Agents using a self-paced CD instructional system, and 16 Expanded Food and Nutrition Program (EFNEP) participants (traditional program with a live teacher). The cost calculations were done on a program that was effective in reducing total cholesterol, LDL cholesterol, other anthropometrics, and increased knowledge and HDL cholesterol.

**Results:** Costs of just implementing with an already developed program such as "Healthy Beat," is approximately $1,654. This was calculated by taking the CD and curriculum development costs of $11,255 (salary, CD authoring, duplication) divided by 100 CD's (which is how many were created for this study) equals $113 dollars per CD copy of program with handouts and links to resources. This amount of $113 for the program was added to the live presentation costs of $711, and instructor's salary of $830 to total $1,654. When no grant is available to develop programs, this can be very cost effective, making it about $42 per participant ($1,654 / 40 participants in a live participation class). It is important to note that the purchasing of the equipment is a large part of the costs; however this can be absorbed by rotating equipment among extension sites. The cost of the lipid kits that accompany the machines can be added to the participant cost of the program at 10.00 per test (making the total cost to participant around $50).

**Conclusions:** The self-paced CD-ROM version of this curriculum can be an alternative to traditional teaching method that may be considered more cost-effective, and was proven to be just as effective in decreasing weight, BMI, and pulse rate as the live participation group.

## Introduction

Research concludes that cardiovascular disease, stroke, and hypertension involve significant social costs, and that various education programs to decrease their prevalence would lead to social gains (47). There is a lack of comprehensive education programs directed toward decreasing cardiovascular disease (CVD) with an emphasis on food portioning skills, cooking skills, low fat cooking techniques, increasing fruits, vegetables and dairy products in the diet, and increasing exercise (47, 49).

Heart disease and stroke cost the U.S. almost $330 billion in 2002. Of this $330 billion, $199 billion was spent for direct medical costs, $31 billion for lost productivity during illness, and $99 billion for loss of future productivity due to premature death. Each year over $33 billion in medical costs and $9 billion in lost productivity due to heart disease, cancer, stroke and diabetes are attributed to diet (52). The cost of cardiovascular diseases and stroke in the United States for 2006 is estimated at $403.1 billion. This figure includes health expenditures (direct costs, which include the cost of physicians and other professionals, hospital and nursing home services, the cost of medications, home health care and other medical durables) and lost productivity resulting from morbidity and mortality (indirect costs) (2). The estimated health care savings from following the DASH diet alone was $200 billion over a 5-year cumulative period, with $37.5 billion coming solely from obesity prevention (19).

There are three major types of cost analyses and all necessitate a pre-determined factor of intervention effectiveness measured by change in health status (59). The most common type is cost-effectiveness analysis, especially in public programs and institutions

(60, 61). The other two are cost-benefit analysis and cost utility analysis. Cost-benefit analyses are very useful, with costs and end-point benefits measured in dollar amounts and reported as a ratio (59). For the scope of the calculations for this study, the costs are calculated in dollars and the end-point benefits are measured in health units, (impact of cardiovascular education on health), and reported in dollar amount saved per participant. This provides a comparison of the effectiveness and benefits of alternative education methods (or lack of). In a literature search of the cost effectiveness and benefits of intervention programs to reduce heart disease risk factors, most references refer to primary or secondary prevention of CVD/hypertension and not comprehensive education programs.

Creating a heart healthy curriculum can be cost effective when compared to short and long term health care costs. Our approach of reporting costs consisted of four major points: 1) Reporting the average cost of initial curriculum and CD development/distribution; 2) Calculating the average cost of initial curriculum and CD development at a Registered Dietitian salary plus the live presentation costs (including salary of instructor) to implement the program. 3) Estimated direct and indirect costs for cardiovascular diseases and stroke for 2006. 4) Potential cost savings on medications and hospitalizations, per participant, after using such a program.

There were one hundred and eighteen participants in the cost analysis group, and the results were limited to individuals within the state of Utah. All costs were reported in 2006 U.S. Dollars.

# Methods

## Participants and Study Design

The cost calculations were calculated on an effective program reported in Chapter 2, where participants over the age of 18 were recruited in Washington, Beaver, and Sanpete Counties in Utah to participate in the seven-session Cooperative Extension heart healthy curriculum traditional program (with a live teacher), Utah State University Extension Agents were recruited at the Annual Extension conference to complete the courses on CD with phone call or email reminders, and a third group consisted of nutrition education assistants from the Expanded Food and Nutrition Education Program (EFNEP), who participated in the traditional program (with a live teacher). After completing the curriculum, the participants came for a final evaluation of skills, blood work, anthropometric measurements, knowledge, and endurance as measured by a six minute walking test to assess long term effectiveness of the program.

Food demonstrations of heart healthy recipes at each session, in addition to the final blood cholesterol test which was provided free, were to provide incentives to complete the course for those doing the live teaching sessions.

It was originally proposed that the Extension Agents pay $30 for the tests and DVD. Upon completion of the course content and the two data collection days, the Extension Agents would be reimbursed for their participation. This was to prevent a high drop out rate and is supported by current literature (12, 54). For this particular study, the Extension Administration chose not to implement this strategy; however it should not be ruled out for future use of the program. The initial group of "community"

participants participated at no cost, whereas the future cost for this program will be $30-$40 per participant plus teacher salary, making it a self-funding program.

**CD-ROM Content**

Each lesson script was edited and reviewed by eight Registered Dietitians from Utah, Idaho, and New Mexico, and the two lessons on physical activity were edited and reviewed by the department head of Exercise Science at Utah State University. In support of the curriculum, the focus of the learning activities that accompanied each session was to: encourage the practice of making healthy choices daily, extending those daily choices into healthy patterns, and personalizing the application of the information gained. By acknowledging the learning process, activities were selected by the fulfillment of criteria to generate active learning and not simply memorizing information or facts. Active learning is one of seven principles in learner centered teaching guidelines according to Philips (51). Cost's that may be associated with this are reported in Appendix A.

**CD-ROM Multimedia**

The main objectives in putting the curriculum content on CD-ROM were to make it "user friendly" and to enhance the learning experience. An opening menu page was created to present organized navigation links to each session, lesson scripts that follow the recorded sessions, learning activities that accompanied the sessions, and additional recipes. Navigation links to "directions for use" and "troubleshooting tips" were also provided (see Appendix B). Users also had the ability to open these manually. Color schemes, readable fonts, learning enhancing interface, clear audio, and overall aesthetic appearance combined the senses to facilitate effective learning.

Recording audio to accompany the PowerPoint sessions was accomplished using the Breeze system. Breeze is a web communication system that allows communication with an audience through multimedia. Breeze is deployed using Adobe Flash Player [which is free, and is already installed on more than 97% of browsers (50)], allowing the participants to view the CD on a majority of office or home computers. Breeze Presenter allowed us to narrate PowerPoint and author a self-paced, e-learning course, with future options to support high-impact content, such as video. University Extension sites have access to Breeze, which allows future classes to be held with on-line meetings. In order to participate, the University purchased a package for $35,000 in 2002, and this initial purchase allowed Cooperative Extension unlimited access at no cost. There is no cost to use Breeze for the Healthy Beat Program; however, a recording microphone is required (average cost of wireless microphone is $50.00 or PC microphone system is $10.00). Breeze also allowed the options of integrating content authored in other Adobe e-learning tools, including Captivate, Authorware, Dreamweaver, and Flash (50), hence, the authoring of CD's can also be accomplished using programs like Flash or Camptasia, that are also available on university campuses. The production process and costs associated with authoring and duplication are discussed in CD-Rom section of this paper. The Extension Agents received this CD of the curriculum (to use at home or at work) every other week, at their convenience.

# Results

## Cost Comparisons of Aspects of the Healthy Beat Program and Healthcare Costs

It took approximately four months to write, organize, edit, and record curriculum for instructional purposes. This is average according to an interview with Dwight Laws (September 2006) who oversees distance education courses developed at Brigham Young University, and is further supported by the former Independent Study Coordinator Elisa O. Taylor (October 2006) at Utah State University who stated that the process and results of calculating the costs of this program were relative and comparable to what is commonly employed for curriculum development and authoring of content on CD-ROM. The cost of curriculum development (at an RD salary of $35.00/hour x 318 hours) is approximately $11,130. Most teachers, Extension Agents, and/or Registered Dietitians would have access to CD/DVD authoring, menu page/interface creation and duplication equipment at an educator's rate ($25.00/hr, $2.50/ CD unit, a unit being a completed CD with label and packaging) which is substantially less than industry rate (average $130.00/hr, $3.00/ CD unit) (see Table 3-1).

Taking the costs in Table 3-1 of initial curriculum/program development, and then adding the costs of actually implementing the program in live presentation and with instructor time equals $12,475- $12,796 depending on who teaches the class. Live presentation costs averaged $711 (see Appendix A for breakdown of costs for live presentation: Handouts, Food, Labels and Menus for activities, incentives). If the CD is used for instruction, the costs are only $11,308 (includes approximately 53.00 for supplemental teaching materials).

In comparison to developing the initial program, the costs of just implementing it with an already developed program such as Healthy Beat, is approximately $1,654. This was calculated by taking the curriculum and CD development costs of $11,255 divided by 100 CD's (the number created for this study) equals $113 dollars per CD copy of program with handouts and links to resources. This amount of $113 for the program was added to the live presentation costs of $711, and instructor's salary of $830 (refer to Table 3-2). When no grant is available to develop programs, this can be very cost effective, making it about $42 per participant ($1,654 / 40 participants in a live participation class). It is important to note that the purchasing of the equipment is a large part of the costs; however this can be absorbed by rotating equipment among extension sites. The cost of the lipid kits that accompany the machines can be added to the participant cost of the program at $10.00 per test (making the total cost to participant around $50).

Table 3 represents the estimated direct and indirect costs (in billions of dollars) of CVD (2). The cost of hospitalization for a heart attack or a stroke is 114.8 billion dollars, and the costs of medications for heart disease, high blood pressure or a stroke are: 21.2, 24.4, and 1.3 billion dollars all totaling 161.7 billion dollars and was summarized from the Heart Disease and Stroke Updates for 2006 (2). Considering the cost of medications more specifically, local pharmacies were contacted and prices were reported for a months prescription (30 pills, 1/day), of Brand name Zocor, Lipitor, and Crestor with 20 mg – 40 mg doses. With out insurance, the average range was $110 - $160 dollars for 20 mg-40 mg doses. Generic brand options are available for Zocor averaging $100 dollars. Insurance coverage would decrease the personal expense to an individual, depending on

provider, as would the situation of the drug being formulary or non-formulary (old vs. new brands). This could not be accounted for in the calculations. Age, medical history and blood tests determine what dose is necessary, and depending on improvements in diet and exercise, a physician can scale back the dose or even completely wean younger patients off the medication.

Compared to the costs of purchasing a curriculum and implementing a community 10 week program that allows participants to monitor their lipid panel, and keep a record of physical activity and goal accomplishments, which averaged $42/participant, it would be accurate to presume that, "an ounce of prevention is worth a pound of cure."

## Discussion

A simple analysis of the data shows that it is possible to reduce the complications of heart disease and adverse health expenditures with use of Healthy Beat curriculum on CD-ROM. The numbers used in these calculations will be unique to future uses of the program depending on number of participants in a class, whether the class is held live or through distance education with the CD, how many times the program is utilized in a year, and how many CD's are created for future purchasing. The amount per participant of around $40- 50 (for live participation), would be $4-5 dollars a week, which provides not only vital education, lipid panel testing, great food samples, support and discussion groups, but a healthy pattern to establish long after the program is completed. There are many benefits that can be drawn from following a heart healthy curriculum whether it is taught in a live classroom setting or multimedia instruction, such as: longevity, quality of

life, cost/month of prescriptions for high cholesterol versus cost to participate in a program.

## Conclusion

The Healthy Beat curriculum on CD, and assessment procedures for behavior and knowledge change, is an effective instrument for education and instruction of a heart healthy lifestyle to reduce hypertension, cholesterol, and to increase application of nutrition and physical activity concepts. A CD version of this curriculum can be an alternative to traditional teaching method that may be considered more cost-effective.

**Table 3-1.** Cost Estimates of Developing CD-ROM and Curriculum for a 10-week class of 40 Participants

| | Raw Material Costs | Production Costs through the University $25/hr $2.50/CD** | Production Costs - Industry Rate $130/hr $3.00/CD** |
|---|---|---|---|
| CD's | $7.20 | $100 | $120 |
| Label's / Packaging | $26.40 | | |
| Duplication Equipment | 0 | $25.00 / hr | $130.00 / hr |
| Recording Equipment | 0 | | |
| Authoring/Menu page Creation | 0 | | |
| Curriculum ¨ | $11,130 | $11,130 | $11,130 |
| **Totals** | $11,164 | $11,255 | $11,380 |

* $9.00/pack of 50 CD's, $20.98/pack of 40 CD Labels, $6.68/pack of 50 CD covers

** Price per CD unit includes labels and packaging, 1-2 hours for authoring/ duplication

¨ Research, organizing information, typing, editing, recording classes. RD Salary $35.00/hr x 318 hours

| **Table 3-2.** Cost Estimates for Implementing the 10 week Program for 40 Participants | | | | |
|---|---|---|---|---|
| | | **Live Presentation**** | | **CD distribution for e-learning purposes** |
| | | Program Coordinator | Nutrition Assistant | |
| Costs of curriculum and CD Development $11255.00 plus teaching materials (Live vs.CD) | | 711.00 | 711.00 | 53.00 |
| **Sub Total** | | 11,966.00 | 11,966.00 | 11,308.00 |
| Instructor Salary* ave 56 hours | | 830.00 | | |
| Instructor Salary* ave 56 hours | | | 509.00 | |
| Costs of Buying the Curriculum on CD | | | | ** |
| **Sub Totals** | | 12,796.00 | 12,475.00 | 11,308.00 |
| Costs of Biochemical and anthropometric assessments for program | | | | |
| Cholesdec Machine | 2000.00 | 2,000.00 | 2,000.00 | 2,000.00 |
| Lipid testing kits | 10.00 | 800.00 | 800.00 | 800.00 |
| Blood sampling supplies | 50.00 | 50.00 | 50.00 | 50.00 |
| Scale | 100.00 | 100.00 | 100.00 | 100.00 |
| **Grand Totals** | | 15,746.00 | 15,425.00 | 14,258.00 |

* Program Coordinator salary of minimum-midrange is 26,410 - 35,258 and based on 9 month academic year
Nutrition Assistant salary approximately 18,912 and based on 50% time (20 hrs/week)

Salary of Program Coordinator, Nutrition Assistant and Program Administrator currently practicing salary range structure from 2001

Depending on the Extension site determines which position (Program Coordinator or Nutrition Assistant) will teach the live session. All three are not recorded in the total and are only reported to reflect each sites scenario for teaching this program.

** costs are included in the CD development subtotal.

** Detailed breakdown of costs associated with live presentation are shown in Appendix A and are calculated for 40 participants in a class.

**Table 3-3.** Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke. United States 2006.

| | Heart Diseases** | Coronary Heart Disease | Stroke | Hypertensive Disease | Heart Failure | Total Cardiovascular Disease* |
|---|---|---|---|---|---|---|
| **Direct Costs** | | | | | | |
| Hospital | 81.3 | 41.8 | 15.5 | 6.2 | 15.4 | 114.8 |
| Nursing Home | 20.7 | 10.9 | 14.3 | 4.2 | 3.9 | 42.6 |
| Physicians/Other Professionals | 19.7 | 11.1 | 3.1 | 11 | 2 | 38.3 |
| Drugs/Other Medical Durables | 21.2 | 9.8 | 1.3 | 24.4 | 3.1 | 50.1 |
| Home Health Care | 5.2 | 1.6 | 3.1 | 1.7 | 2.4 | 11.8 |
| Total Expenditures* | 148.1 | 75.2 | 37.3 | $47.5* | 26.8 | 257.6 |
| **Indirect Costs** | | | | | | |
| Lost Productivity/Morbidity | 21.9 | 9.6 | 6.4 | 7.7 | | 35.6 |
| Lost Productivity/Mortality++ | 88.5 | 57.7 | 14.2 | 8.3 | 2.8 | 109.9 |
| Grand Totals* | 258.5 | 142.5 | 57.9 | 63.5 | 29.6 | 403.1 |

Note: (-) = data not available.

* Totals don't add up due to overlap

** Category includes coronary heart diseases, heart failure, part of hypertension disease, cardiac dysrhythmias, rheumatic heart diseas, cardiomyopathy, pulmonary heart disease, and other less defined heart diseases.

• Tome Hodgson and Liming Cai (Medical Care 2001) estimated that healthcare expenditure attributed to hypertension that could be allocated to cardiovascular complications and other diagnoses totaled $108 billion in 1997

¨ Lost future earnings of persons who will die in 2006, discounted at 3%.

# CHAPTER 4

## GENERAL CONCLUSIONS

With cardiovascular disease (CVD) being the leading cause of death in the nation, accounting for 38.6% of all deaths and a contributing factor to 60% of all deaths in 2004, health education efforts to reduce the risk for CVD have been a priority of national and statewide agendas. As part of this effort, the Cooperative Extension services funded the development of the Healthy Beat curriculum that was tested in live participation groups and CD-ROM participation groups in order to extend this program to rural/urban extension sites; increasing the availability of education programs through macromedia and online distance education.

This paper has integrated proven significance of health education with the literature surrounding: indicators for CVD, metabolic syndrome, Dietary Approaches to Stop Hypertension (DASH Diet), weight loss, exercise, dietary lipids, folic acid, and other associated nutrients. Our findings with the "Healthy Beat" program are congruent with current literature stating that hands on activities, and personal goal setting, combined with nutrition and physical activity education through a 10 week program was effective in assisting participants to reduce their risk of CVD.

Through a simple analysis of costs associated with running the program in live participation groups or CD participation groups, it was found that using the CD for instruction was the most cost effective; however, both instructional methods were more cost effective when compared to monthly expenditures on medications to lower cholesterol.

Strong trends in data were evident, even though there were minimal significant correlations due to sensitivity of sample size. Previous knowledge or existence of hypertension, hypercholesterolemia and/or family history of heart disease, and existing risk factors does not appear to be a strong motivator to change heart disease risk factors in these groups. It appeared that participants had a higher perceived knowledge and behavior increase than was reflected by final data collection and test scores. Taking into account the feasibility of calling participants and/or emailing them, it appears that using one type of reminder is just as effective as using two types of reminders simultaneously.

After evaluating the post anthropometrics and biochemical results, it appeared that even though it was reported that participants were fasting, the triglycerides were unchanged or even higher. Insulin resistance, metabolic risk factors, central adiposity are factors that may have attributed to this result. Other data seemed to improve, however, especially the waist and hip circumferences, (which may rule out central obesity as the cause).

It appears that the participants in the live participation group had significantly increased test and evaluation scores compared to the CD group ($p = .014$). The CD participation group, however, had highly significant differences in anthropometrics and biochemical changes than the live participation group as follows: weight decreased almost 5 pounds for the CD group and almost 2 pounds for the live ($p = .002$), BMI decreased .754 for CD group and .325 for live participation group ($p = .003$), and pulse rate decreased 7.08 in CD group and increased 1.3 in live participation group ($p = .004$). It appeared that in all three groups, women had greater knowledge prior to, and after the course than did males.

The differences may be explained by evaluating the motivation of the participants. In this study the live participation group appeared to have a stronger emphasis on learning the content, where as the participants in the CD group focused mainly on change in behavior.

Even though EFNEP participants were taught in a live traditional setting, it was necessary to evaluate the group as a separate third group due to the fact that it consisted of female participants only who had a higher knowledge of nutrition concepts and who generally had less potential for change (started with lower BMI and cholesterol). Due to this factor, there were no significant changes in knowledge, behavior, anthropometrics, or lipids except for triglycerides which were significantly higher at final data collection. This could be due to the fact that this group was comfortable with their knowledge and behaviors and even though it seemed that they took action, as evidenced by the improved endurance in the 6-minute walk test, and high before/after evaluations of the course, (what they perceived to change or learn was highly significant with an average of 43.93 out of 70 on pre-assessment to an average of 61.20 out of 70 on the post-assessment ($p = < .001$)). They had significant change in knowledge from pre-assessment average of 17.63 to post assessment average of 19.36 ($p = .042$), however not as significant as the other two groups.

The Healthy Beat curriculum on CD, and assessment procedures for behavior and knowledge change, is an effective instrument for education and instruction of a heart healthy lifestyle to reduce hypertension, cholesterol, and to increase application of nutrition and physical activity concepts for those who need drastic or modest changes in

behavior and lifestyle. A CD version of this curriculum can be an alternative to traditional teaching method that may be considered more cost-effective.

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# APPENDICES

# Appendix A.

## Live Presentation Class Costs Sheet

|  | 1. Cholesterol and Exercise | 2. Cholesterol and Fat in the Diet | 3. Nutrients that Affect Heart Health | 4. Surviving the Real World | 5. Physical Activity: Why should I be active? | 6. Physical Activity: Where Do I Start? | 7. DASH to Your Success | Total cost of each row for all sessions |
|---|---|---|---|---|---|---|---|---|
| Handouts x 40 people | 2.40 | 7.20 | 16.20 | 4.80 | 7.20 | 7.20 | 12.00 | 57.00 |
| Folders with Logo x 40 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.00 |
| DVD's (compact dics) | 9.00 | | | | | | | 9.00 |
| Pre-Test (5 pages x 40) | 12.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.00 |
| Post-Test (5 pages x 40) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.00 | 10.50 |
| Data Collection Sheets x 40 | 2.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.10 |
| Exercise Log x 40 | 2.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.10 |
| Weekly Goals Sheet x 40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 16.80 |
| Information Sheet (2 pages x 40) | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.80 |
| Cholesterol panel ($10.00 x 40) | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 400.00 | 800.00 |
| Food Items for Cooking Demos | 0.00 | 30.00 | 20.00 | 25.00 | 30.00 | 37.00 | 0.00 | 142.00 |
| Laminated Food Labels (Activity) | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 |
| Laminated Menus (Activity) | 0.00 | 0.00 | 0.00 | 10.00 | 0.00 | 0.00 | 0.00 | 10.00 |
| Recipie Alteration Activity | 0.00 | 0.00 | 0.00 | 4.20 | 0.00 | 0.00 | 0.00 | 4.20 |
| My Pyramid handouts | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Barriers to being active quiz x 40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.20 | 0.00 | 6.30 |
| Copies of Class Evaluation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.40 | 2.10 |
| **Total Cost of Each Session** | **460.40** | **39.60** | **42.60** | **46.40** | **39.60** | **53.80** | **428.80** | |
| **Cost per person (40 people)** | **11.50** | **1.00** | **1.07** | **1.16** | **1.00** | **1.35** | **10.72** | |
| **Total Cost of All Sessions** | **1111.20** | | | | | | | |
| **Incentives for Class** | nice recipe box | gift cert. to grocery stores | Recipe book | 10.00 restarurant certificates | set of 3 lb weights or other equipment | pedometers | | |
| **Donated Costs** | **$ 2,000 Machine (one time purchase)** | | | **Accurate Scales $100 one time purchase** | | **Caplillary tubes/plungers, finger pokers, alcohol swabs, gloves** | | |

* * Food costs were calculated using grocery prices online and are averaged for one recipe. It is possible to do two recipes per session.

* * The estimated food costs may vary due to location purchased, taxes, and any rising food costs or sales

* * handout costs were calculated at .06 x # of pages x 40 participants

# Appendix B.

## Further Resources in Development of Curriculum not Specified in Text

**Main web page used for this curriculum**
http://www.cdc.gov/nccdphp/dnpa/physical/index.htm. Accessed on 2/22/05

**Personal Barriers**
U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. Promoting physical activity: a guide for community action. Champaign, IL: *Human Kinetics*, 1999.

**Personal and Environmental Barriers**
Pate RR, Pratt M, Blair SN, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273(5):402-407.

Pratt M. Exercise and sudden death: implications for health policy. *Sport Science Review Journal* 1995;4(2):106-122.

Sallis JF, Hovell MF. Determinants of exercise behavior. *Exercise and Sport Science Reviews* 1990;18:307-330.

Sallis JF, Hovell MF, Hofstetter CR. Predictors of adoption and maintenance of vigorous physical activity in men and women. *Preventive Medicine* 1992;21(2):237-251.

**Intensity of activity slides**
Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. *Medicine and Science in Sports and Exercise* 1993;25(1):71–80.

Borg G. Perceived exertion and pain scales. Champaign (IL): *Human Kinetics*, 1998.

**For getting started section**
Centers for Disease Control and Prevention & Cooper Institute for Aerobics Research. Personal energy plan-physical activity: steps for adding PEP to your life. Dallas: Cooper Institute; 1999.

**Definition for sedentary**
The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2004, 2000 by Houghton Mifflin Company

**Components of Exercise**
U.S. Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.

**New Dietary Guidelines**

Dietary Guidelines for Americans 2005. Available at http://www.health.gov/dietaryguidelines/dga2005/document/html/chapter4.htm. Accessed on 3/22/05.

MyPyramid available at http://www.mypyramid.gov/professionals/index.html.

**DASH studies and Brochure**

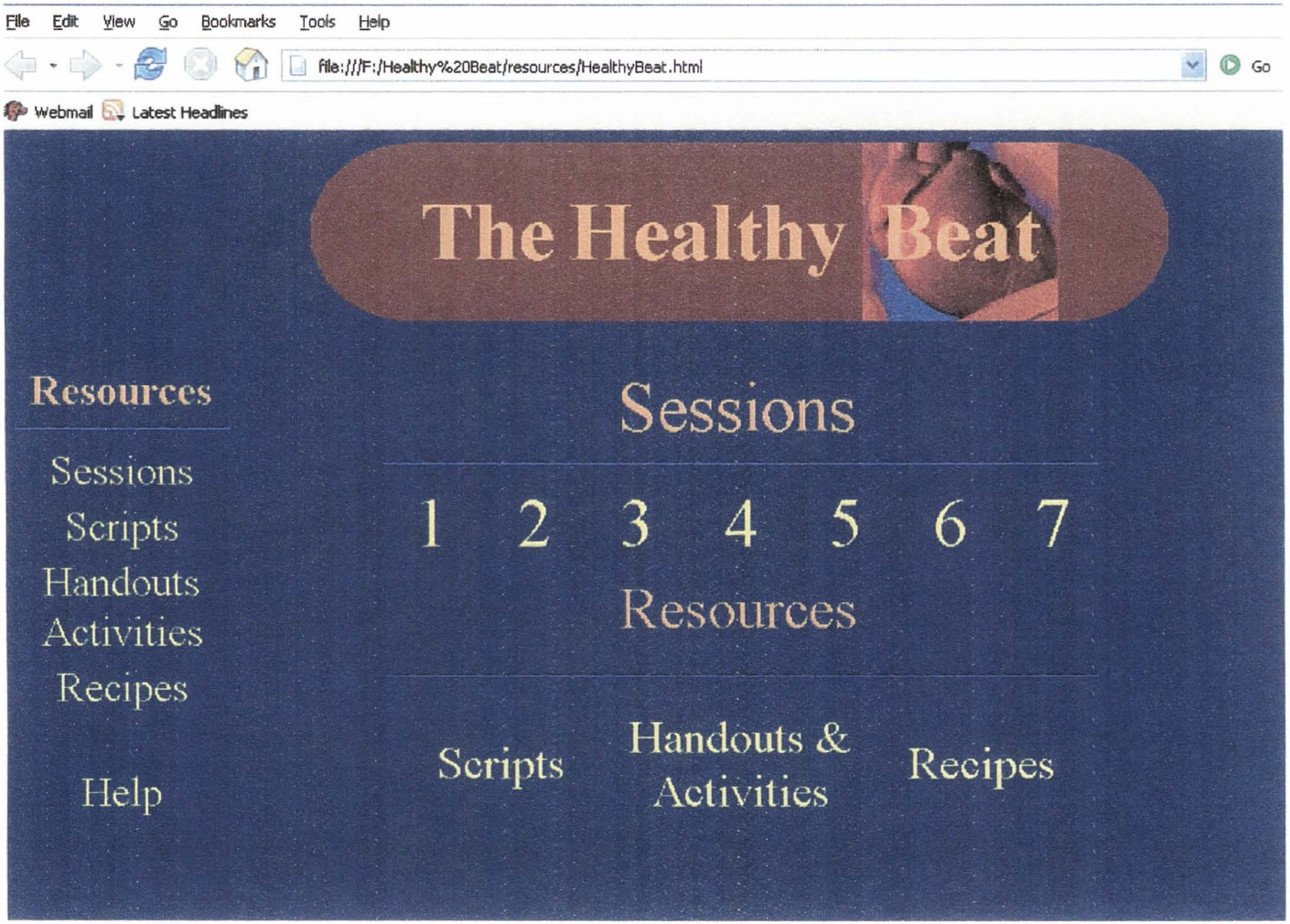
Frank M. Sacks et al. Effects on Blood Pressure of Reduced Dietary Sodium and the Dietary Approaches to Stop Hypertension (DASH) Diet. *N Engl J Med* 2001:344(1).

Lawrence J. Appel, M.D., M.P.H., et al. *N Engl J Med* 1997;336:1117-24.

Marilyn S. Townsenda, Victor L. Fulgoni IIIb, Judith S. Sterna, Seth Adu-Afarwuaha and David A. McCarrona. Low mineral intake is associated with high systolic blood pressure in the Third and Fourth National Health and Nutrition Examination Surveys: Could we all be right? *American Journal of Hypertension* Feb. 2005:18(2). Pages 261-269. used in curriculum development.

# Appendix C.

## Menu Page for CD-ROM


File Edit View Go Bookmarks Tools Help
file:///F:/Healthy%20Beat/resources/HealthyBeat.html
Go
Webmail
Latest Headlines
The Healthy Beat
Resources
Sessions
Scripts
Handouts
Activities
Recipes
Help
Sessions
1 2 3 4 5 6 7
Resources
Scripts
Handouts & Activities
Recipes

# Appendix D.

## Informed Consent

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Continuing Review Revision Approved: 11/30/2005
Page 1 of 3
Utah State University Original IRB Approved 01/08/2004
Approval terminates 11/29/2006; Protocol Number: 868
IRB Password Protected per True M. Rubal, IRB Administrator

## Informed Consent

Development of a Nutrition Education Series by Utah State University Extension Service to Improve the Health of People with Heart Disease

**Purpose:** Utah State University Extension Service is conducting a study to determine the effectiveness of a series of nutrition education programs for people with heart disease. Participation in this study would require that you to attend a series of education sessions on nutrition that will be conducted as part of the USU Extension Service. Participants of Salt Lake County have the option of providing a blood sample from a finger stick at the beginning and at the end of the series of sessions. I will be able to attend either the afternoon or evening classes (located at the Utah State University County Extension Office) that will focus on lifestyle challenges (e.g. low fat cooking techniques, portion sizes, eating at social gatherings, recipes, etc.). A fee, not to exceed $50 will be required for the six week long education sessions to cover the handouts and educational materials provided and for the analysis of the blood samples (total cholesterol, LDL cholesterol, HDL cholesterol & triglycerides). This blood sample is the usual assessment for heart disease. This is the usual fee charged by the Extension Service for an educational series of this type.

**Procedures:** I understand that as a participant in this project:

1) I will attend seven group classes over a six week time period.
2) I will have height and weight, obtained at the first visit, at the end of the program, which is approximately six weeks.
3) I will complete a survey at the beginning of the study regarding questions of heart medications, age at diabetes diagnosis, income level and education level.
4) I will complete a survey at the end of the study regarding my satisfaction of the services provided.
5) I will provide two finger stick blood samples to determine serum cholesterol control if participating in Salt Lake County.
6) I will complete two six-minute walks if I have not physical limitation in doing so.
7) I will complete a 3-day dietary recall at the beginning and at the completion of the study.

**New Findings:** I will be provided with current information at the Healthy Beat classes and at individual instruction sessions. During the course of this study, I will be informed of any changes in my cholesterol levels. I will be referred to my private health care provider if the results of the total cholesterol are greater than 240 mg/dl to check if a change in medication or therapy is necessary.

**Risks:** The slight risk and discomfort of drawing a finger stick blood sample will be minimized by following standard clinical protocol and being done by a trained professional. Clinic procedures in determining cholesterol readings as outlined by the Utah State Health Department, Cardiovascular Program, will be used, so there are no foreseeable risks.

Utah State University
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Continuing Review Revision Approved: 11/30/2005
Page 2 of 3
Utah State University Original IRB Approved 01/08/2004
Approval terminates 11/29/2006; Protocol Number: 868
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**Informed Consent**

Development of a Nutrition Education Series by Utah State University Extension Service to Improve the Health of People with Heart Disease

**Benefits:** In return for my participation, I understand that I will learn skills in low fat cooking techniques, food portioning and the latest information about nutrition for heart disease. I will also have the cholesterol and triglyceride values that will be available for my preferred-designated physician or health care provider.

**Explanation and Offer to Answer Questions:** An employee of Utah State University Extension Service will explain this study to me before I sign this consent form. Any questions relating to the procedures used in this study can by answered by Nedra Christensen at (801) 484-9374 or Pauline Williams at (801) 468-3176.

**Costs:** There will be a fee, not to exceed $50 registration fee for participating in this study. This fee will cover the costs for handouts and educational materials for the six week program and for two cholesterol measurements for assessing heart disease. Other Counties in Utah do not have access to the blood work and will have a lower cost for participation. There will not be a refund if I do not complete the study.

**Voluntary Nature of Participation:** I understand that I am free to withdraw or decline to participate in this project at any time without consequence, which in no way jeopardizes my participation in services I now receive or may receive in the future.

**Confidentiality:** All data will be kept in a locked file cabinet, in a locked room. Your name will be assigned an ID number to identify you in this research. The data will be kept for the two year data collection period and then will be destroyed. All data will be analyzed using ID numbers and reports will use only group data. No information which could be used to identify a specific person will be released. Nedra Christensen and Pauline Williams will be the only people with access to the data.

**IRB Approval Statement:** The Institutional Review Boards (IRB) for the protection of human subjects at Utah State University has reviewed and approved this research project. If you have any questions about your rights in this study you may contact the IRB Office at (435) 797-1821.

**Copy of Consent:** Two copies of this Informed Consent have been provided for your signature. Please retain one copy for your files and return the second signed copy to the researchers.

Utah State University

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Page 3 of 3
Utah State University Original IRB Approved 01/08/2004
Approval terminates 11/29/2006; Protocol Number: 868
IRB Password Protected per True M. Rubal, IRB Administrator

**Informed Consent**

Development of a Nutrition Education Series by Utah State University Extension Service to Improve the Health of People with Heart Disease

**Investigator Statement:** I certify that the research study has been explained to the individual, by me or by Utah State University Extension Personnel or Utah State Senior Dietetic Program students, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.

Nedra K. Christensen Dec 9, 2005
Nedra K. Christensen PhD, RD Date
Principal Investigator
(801) 484-9374
Utah State University

12/23/05
Clinton Albrecht MS Date
Extension Service Agent
(435) 843-2353
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Carolyn Washburn 12/15/05
Carolyn Washburn MS Date
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**Signature of Subject:** By signing below, I agree to participate.

Name of Participant_____ Date_____

Signature of Participant_____ Date_____

# Appendix E.

## Revised Knowledge Test and Self Evaluation

**The Healthy Beat**
Pre/Post-Test

Name: _____ Date: _____

ID: _____

1. Which type of cholesterol is the "good" cholesterol?
   a. LDL
   b. HDL
   c. VLDL
   d. Triglycerides
   e. I don't know

2. What is the healthy recommendation for total cholesterol levels?
   a. Less than 200 milligrams/deciliter
   b. More than 200 milligrams/deciliter
   c. Exactly 200 milligrams/deciliter
   d. Less than 150 milligrams/deciliter
   e. I don't know

3. Which of the following are risk factors for heart disease?
   a. Excess weight
   b. Diabetes
   c. Physical inactivity
   d. Smoking
   e. All of the above
   f. I don't know

4. Which of following is <u>not</u> a benefit of exercising?
   a. Decrease triglycerides
   b. Increase LDL
   c. The most easily modifiable risk factor for heart disease
   d. Decrease LDL to HDL ratio
   e. Increase HDL
   f. I don't know

5. What percent of our daily caloric intake should come from fat?
   a. $\leq$ 10-15%
   b. $\leq$ 15-20%
   c. $\leq$ 20-35%
   d. $\leq$ 35-40%
   e. I don't know

6. Which type of fat is considered unhealthy for your heart?
    a. Polyunsaturated
    b. Monounsaturated
    c. Saturated
    d. Omega-3 fatty acids
    e. I don't know

7. The type of fat found in olive and canola oil is:
    a. Monounsaturated
    b. Polyunsaturated
    c. Tran-fatty acids
    d. Saturated
    e. I don't know

8. Margarine, shortening and many manufactured foods contain which type of fat?
    a. Polyunsaturated
    b. Saturated
    c. Trans-fatty acids
    d. Omega-3 fatty acids
    e. I don't know

9. In what food is cholesterol found?
    a. Peanut butter
    b. Chicken
    c. Banana
    d. Avocado
    e. I don't know

10. What is the daily recommendation for most persons for cholesterol intake?
    a. 100 milligrams
    b. 200 milligrams
    c. 300 milligrams
    d. 400 milligrams
    e. I don't know

11. Which food is cholesterol free?
    a. Egg whites
    b. Egg yolk
    c. Milk
    d. Cheese
    e. I don't know

12. Soluble fiber aids in:
    a. Lowering cholesterol
    b. Weight loss
    c. Maintaining bowel function
    d. Raising cholesterol
    e. I don't know

13. Which foods are high in fiber?
    a. Fruits
    b. Vegetables
    c. Whole grains
    d. Poultry products
    e. a & b
    f. a, b & c
    g. All of the above
    h. I don't know

14. The recommended daily amount for fiber is:
    a. 10-15 grams
    b. 15-20 grams
    c. 25-35 grams
    d. 35-45 grams
    e. I don't know

15. The risk for heart disease is reduced with high dietary intakes of:
    a. selenium
    b. riboflavin
    c. boron
    d. magnesium & potassium
    e. I don't know

16. Homocysteine is an amino acid, derived from excess methionine.
    a. True
    b. False
    c. I don't know

17. Which nutrient can decrease heart disease risk by lowering homocysteine?
    a. folic acid
    b. vitamin C
    c. calcium
    d. thiamin
    e. I don't know

18. Which option would help lower the fat and calories when eating out
    a. Ordering grilled chicken breast
    b. Ordering sautéed chicken breast
    c. Ordering fried chicken breast
    d. Ordering lightly breaded chicken breast
    e. I don't know

19. Which soup tends to be the least healthy choice when comparing the fat content?
    a. Chicken Noodle
    b. Minestrone
    c. Clam Chowder
    d. Tomato
    e. I don't know

20. A heart healthy choice to use instead of sour cream would be:
    a. plain non-fat yogurt
    b. sweetened condensed milk
    c. cream cheese
    d. clarified butter
    e. I don't know

21. A heart healthy diet consists of which factors?
    a. Low-Sodium
    b. High cholesterol
    c. Low-fat, especially saturated
    d. High fiber
    e. Both a, c & d
    f. All of the above
    g. I don't know

22. How often do you read or look at food labels when shopping?
    a. Never
    b. Occasionally
    c. Most the time
    d. All the time

23. Have you ever been instructed on a diet for heart disease before?
    a. Yes
    b. No

24. If YES, whom were you instructed by? (circle all that apply)
    a. College course

b. EFNEP/WIC course
c. Registered Dietitian (in hospital or out-patient)
d. Physician
e. Nurse
f. Other_____

25. What makes following a heart healthy diet difficult for you? (circle all that apply)
    a. Time
    b. Expense
    c. Lack of family support
    d. Too complicated
    e. I don't see a benefit
    f. I feel restricted
    g. Other_____
    h. Following a heart healthy diet is NOT difficult

26. How often do you make recipes substitutions to make a recipe more heart healthy?
    a. Never
    b. Occasionally
    c. Most the time
    d. All the time

27. Do you have a family history of heart disease?
    a. Yes
    b. No

28. Are you aware of your blood cholesterol levels and what the numbers mean?
    a. Yes
    b. No

29. The DASH diet (Dietary Approaches to Stop Hypertension) focuses mostly on which factors?
    a. more fruits and vegetables
    b. low-fat dairy foods
    c. lower sodium intake
    d. lower total and saturated fat
    e. a, b & d
    f. a,b,c, & d
    g. I don't know

30. An example of moderate intensity activity would be:
    a. A leisure 15 minute walk
    b. Mowing the lawn 30 minutes
    c. Light stretching or warm ups

d. Light gardening, dusting or vacuuming
e. I don't know

31. Normal Blood pressure should be less
a. 120/80
b. 140/90
c. 150/90
d. 180/ 100
e. I don't know

32. You can lower your risk of cardiovascular disease with physical activity by
a. Moderate activity 30 minutes a day
b. Light activity 3-5 times a week
c. Walking 2 miles a day (15minute mile)
d. Light house work
e. Both a & c only
f. I don't know

# The Healthy Beat

## *Evaluation*

Name: _____ Date:_____ ID#: _____

*Please evaluate your knowledge in each of the following areas with the key below:*

*1=no knowledge*
*3= some knowledge*
*5=adequate knowledge*

| Before Course | Evaluate this course by circling the correct number about your knowledge of: | After Course |
|---|---|---|
| 1 2 3 4 5 | 1. Cholesterol numbers and their role | 1 2 3 4 5 |
| 1 2 3 4 5 | 2. The types of fat and their effect on cholesterol | 1 2 3 4 5 |
| 1 2 3 4 5 | 3. The role fiber plays in lowering cholesterol | 1 2 3 4 5 |
| 1 2 3 4 5 | 4. The effects of high cholesterol on the body | 1 2 3 4 5 |
| 1 2 3 4 5 | 5. The role of sodium in heart health | 1 2 3 4 5 |
| 1 2 3 4 5 | 6. The role of folic acid in heart health | 1 2 3 4 5 |
| 1 2 3 4 5 | 7. The role of fruits, vegetables and low fat dairy products in heart health | 1 2 3 4 5 |
| 1 2 3 4 5 | 8. Making wise choices when eating out and snacking | 1 2 3 4 5 |
| 1 2 3 4 5 | 9. Recipe substitutions to make food heart healthy | 1 2 3 4 5 |
| 1 2 3 4 5 | 10. The importance of exercise in heart health | 1 2 3 4 5 |

*Please evaluate your ability/behavior/actions with the key below:*

*1=never made this action*
*3= made this action 2 days a week*
*5=have done this action daily*

| Before Course | Evaluate this course by circling the correct number about your ability/behavior/actions for: | After Course |
|---|---|---|
| 1 2 3 4 5 | 11. Looking at the fiber, cholesterol, sodium and fat content on a food label | 1 2 3 4 5 |
| 1 2 3 4 5 | 12. Exercising or increasing daily physical activity | 1 2 3 4 5 |
| 1 2 3 4 5 | 13. Using more healthy fats when cooking | 1 2 3 4 5 |
| 1 2 3 4 5 | 14. Consuming more fruits, vegetables & low fat dairy products each day | 1 2 3 4 5 |

# Appendix F.

## Satisfaction Survey

## Healthy Beat Satisfaction Survey

*Has participating in the Healthy Beat Cardiovascular Program helped you?*
*These are your opinions - there are no right or wrong answers*

Check the box that expresses your feelings **[X]**

| HOW USEFUL WAS THIS PROGRAM IN . . . | Very Useful | Useful | Not Useful | Needs Change |
|---|---|---|---|---|
| **1.** Teaching you new cooking skills? | | | | |
| **2.** Helping you learn which nutrients in foods affect your heart? | | | | |
| **3.** Helping you to know how to read labels when shopping /cooking? | | | | |
| **4.** Helping you to set and maintain your goals? | | | | |
| **5.** Helping you learn more about heart disease? | | | | |
| **6.** Helping you learn how to prevent high blood pressure? | | | | |
| **7.** Motivating you to include physical activity in your day? | | | | |
| **8.** Would you refer this program to your family or friends? **Yes___ No___ Because it was:** | | | | |
| **TELL US WHAT YOU LIKED ABOUT THE PROGRAM** | **Yes Extremely** | **Generally** | **Generally Not** | **No** |
| **9.** Did you like the handouts that were provided? | | | | |
| **10.** Did you enjoy participating in the Healthy Beat activities? | | | | |
| **11.** Did you like the recipes that were provided? | | | | |

*12. Choose the most important reason you came to the Healthy Beat Program*
○ Heart disease ○ To learn about nutrition and/or physical fitness ○ Concern for future health issues ○ Other Reasons:

*13. Which topics were your favorite and why?*

_____

_____

*14. What are the things we could do to make the Healthy Beat Program better for you?*

_____

_____

*15. Your age?* ○ 25-35 ○ 36-45 ○ 46-55 ○ 56-65 ○ 66-75 ○ 75 or above

*16. Are you:* ○ Male ○ Female

*17. When in the day did you use the Healthy Beat Program? (most often)*
○ Morning (office computer) ○ Afternoon (office computer) ○ Evening (office computer)
○ Morning (at home) ○ Afternoon (at home) ○ Evening (at home)

*18. If there is anything else you would like to share with us about your experience with the Healthy Beat Program, please tell us below. Feel free to use space on back to write!*

_____

*Thank You!*

# Appendix G.

## Specific Behavior Changes Experienced by Each Group

| Change reported in % for pre-course to post-course behavior modifications | | | | | | |
|---|---|---|---|---|---|---|
| | Live Group | | CD group | | EFNEP | |
| **Behavior** | pre | post | pre | post | pre | post |
| **Read Labels** | | | | | | |
| Never | 12.7 | | 10 | 3.3 | | |
| Occasionally | 43.6 | 18.2 | 51.7 | 43.3 | 11.8 | 11.8 |
| Most the time | 30.9 | 40 | 30 | 41.7 | 47.1 | 47.1 |
| All the time | 9.1 | 20 | 8.3 | 8.3 | 35.3 | 35.3 |
| Total* | 96.4 | 78.2 | 100 | 96.7 | 100 | 94.1 |
| **Diet Instruction** | | | | | | |
| Yes | 20 | 23.6 | 25 | 36.7 | 23.5 | 47.1 |
| No | 76.4 | 56.4 | 75 | 60 | 75 | 47.1 |
| Total* | 96.4 | 80 | 100 | 96.7 | 94.1 | 94.1 |
| **If YES, Instructed by:** | | | | | | |
| College course | 3.6 | 3.6 | 8.3 | 20 | | |
| EFNEP/WIC course | 1.8 | 3.6 | 1.7 | 3.3 | 29.4 | 29.4 |
| Registered Dietitian | 12.7 | 7.3 | 8.3 | 3.3 | | 5.9 |
| Physician | 7.3 | 12.7 | 6.7 | 8.3 | | 5.9 |
| Nurse | | 1.8 | 1.7 | 1.7 | | |
| Other | 3.6 | 3.6 | 8.3 | 8.3 | | 5.9 |
| **What makes following a heart healthy diet difficult?** | | | | | | |
| Time | 40 | 34.5 | 46.7 | 53.3 | 64.7 | 47.1 |
| Expense | 14.5 | 20 | 13.3 | 20 | 11.8 | 5.9 |
| Support | 18.2 | 14.5 | 10 | 13.3 | 17.6 | |
| Complicated | 20 | 3.6 | 21.7 | 11.7 | | |
| No Benefits | 1.8 | | | 1.7 | | 5.9 |
| Restrictive | 10.9 | 7.3 | 10 | 6.7 | 17.6 | 11.8 |
| Other | 12.7 | 12.7 | 28.3 | 20 | 5.9 | 5.9 |
| It is NOT difficult | 18.2 | 20 | 10 | 13.3 | 41.2 | 29.4 |
| **Make recipe substitutions** | | | | | | |
| Never | 32.7 | 7.3 | 23.3 | 10 | 11.8 | |
| Occasionally | 43.6 | 41.8 | 60 | 61.7 | 35.3 | 47.1 |
| Most the time | 18.2 | 23.6 | 16.7 | 25 | 41.2 | 29.4 |
| All the time | | 5.5 | | | 5.9 | 17.6 |
| Total* | 94.5 | 78.2 | 100 | 96.7 | 94.1 | 94.1 |
| **Family History Awareness of CVD** | | | | | | |
| Yes | 47.3 | 49.1 | 45 | 50 | 52.9 | 58.8 |
| No | 47.3 | 29.1 | 53.3 | 46.7 | 41.2 | 35.3 |
| Total* | 94.5 | 78.2 | 98.3 | 96.7 | 94.1 | 94.1 |
| **Awareness of cholesterol #'s and what they mean** | | | | | | |
| Yes | 29.1 | 69.1 | 35 | 78.3 | 70.6 | 88.2 |
| No | 63.6 | 5.5 | 61.7 | 13.3 | 23.5 | 11.8 |
| Total* | 92.7 | 74.5 | 96.7 | 91.7 | 94.1 | 100 |

* Total percentages are of those who responded to the question.